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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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A. Current Abstracts in English on important meteorological literature in every language.

B. Bibliographic references to other items of interest to the profession.

C. Selective, annotated bibliographies on subjects of immediate and special interest to meteorologists.

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 1 AUGUST 1950 No. 8

SPECIAL FEATURE IN THIS ISSUE

A Selective Annotated Bibliography on Thunderstorms

(*For complete table of contents see back cover*)

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FOREWORD

Each issue of Meteorological Abstracts and Bibliography consists of four parts, as ca be seen in the table of contents on the back cover.

Part I comprises 100 to 200 classified and annotated references to current material in th field of *Meteorology* and other fields immediately applicable to *Meteorology*.

In addition, the first issue (Vol. 1, No. 1) contained a **Review of 30 Current Meteorologica Periodicals,** and the second issue a **Review of 15 Meteorological Periodicals which have lapsed**

Part II of each issue provides a means of accumulating the important references on give subjects without respect to recency. It is impossible to make these bibliographies exhaustiv under present personnel, time and printing limitations; but every attempt is made to include representative cross section of the various aspects of each subject, some preference being give to recent material, comprehensive works, those from obscure sources and those with goo bibliographies.

Selective, annotated bibliographies consisting of from 50 to 300 items each, have bee printed in the issues of Meteorological Abstracts and Bibliography, as follows:

(1) **Atmospheric Pollution,** Vol. 1, No. 1, Jan. 1950
(2) **Aerobiology,** Vol. 1, No. 2, Feb. 1950
(3) **Cloud Physics and "Rain Making,"** Vol. 1, No. 3, March 1950
(4) **Hail,** Vol. 1, No. 4, April 1950
(5) **Tornadoes,** Vol. 1, No. 5, May 1950
(6) **Volcanic Dust,** Vol. 1, No. 6, June 1950
(7) **Climatic Changes,** Vol. 1, No. 7, July 1950
(8) **Thunderstorms,** Vol. 1, No. 8, August 1950

Future issues will contain:

(9) **Icing,** Vol. 1, No. 9, September 1950
(10) **Acoustical Sounding of the Stratosphere,** Vol. 1, No. 10, October 1950
(11) **Evaporation,** Vol. 1, No. 11, November 1950

In Part III the contents of those journals which are primarily meteorological are liste and published in the earliest issue where space permits. These entries are not classified o indexed.

Part IV consists of author, subject and geographical indexes. The subject and ge graphical indexes are made up, as a rule, from the subject headings which follow each entr

In the June and December issues *cumulative* author and subject indexes will be publishe

LIST OF PERIODICALS

Note: In this list the preferred form of title for entry is given in bold face type. If the title is distinctive, the name and headquarters of the issuing society or organization follows the title. If the title is not distinctive the issuing organization precedes and is part of the title.

PERIODICALS IN WHICH METEOROLOGICAL ARTICLES REGULARLY APPEAR

Akademiia Nauk, SSSR, Izvestiia, Ser. Geogr. i Geofiz., [Moscow].
American Geophysical Union, Transactions, National Research Council, Washington.
★**American Meteorological Society, Bulletin,** [Boston].
★**Annalen der Meteorologie,** Meteorologisches Amt für Nordwestdeutschland, Hamburg.
Annali di Geofisica, Istituto Nazionale di Geofisica, [Rome].
Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A and Ser. B, [Vienna].
Ciel et Terre, Société Belge d'Astronomie, de Météorologie et de Physique du Globe. Uccle-Bruxelles.
Geofisica Pura e Applicata, Istituto Geofisica Italiano, [Milan].
Geophysical Magazine, [Central Meteorological Observatory, Toyko].
Hemel en Dampkring, Nederlandse Vereniging voor Weer- en Sterrenkunde, [The Hague].
★**Idöjárás,** Az Országos Meteorológiai és Földmágnességi Intézet, [Budapest].
★**Indian Journal of Meteorology and Geophysics,** [Delhi].
Journal of Geophysical Research (formerly Terrestrial Magnetism and Atmospheric Electricity), [Washington].
★**Journal of Meteorology,** American Meteorological Society, [Boston].
★**Journal Scientifique de la Météorologie,** Société Météorologique de France, [Paris].
★**The Marine Observer,** Air Ministry, Meteorological Office, London.
★**The Meteorological Magazine,** Air Ministry, Meteorological Office, London.
★**Meteorological Society of Japan, Journal,** Second Series, Kisho Shushi, [Tokyo].
★**Meteorologické Zprávy,** Státní Meteorologický ústav v Praze, [Prague].
★**La Météorologie,** Société Météorologique de France, [Paris].
★**Meteorologische Rundschau,** Bad-Kissingen, [U. S. Zone, Germany].
★**Monthly Weather Review,** U. S. Weather Bureau, Washington, D. C.
★**Nimbus,** Sociedad Meteorológica de Bolivia, [La Paz].
Polarforschung, Archiv für Polarforschung in Kiel, [Kiel, British Zone, Germany].
★**Revista Meteorológica,** Junta Nacional de Meteorología, Montevideo.
★**Rivista di Meteorologia Aeronautica,** Associazione Culturale Aeronautica, [Rome].
★**Royal Meteorological Society, Quarterly Journal,** [London].
★**Tellus,** Svenska Geofysiska Föreningen, Stockholm.
Vsesoiuznoe Geograficheskoe Obshchestvo, SSSR, Izvestiia, [Moscow-Leningrad].
★**Weather,** Royal Meteorological Society, [London].
★**Weather Development and Research Bulletin,** Australia, Meteorological Branch, [Melbourne].
★**Weatherwise,** Amateur Weathermen of America, Philadelphia.
★**Wetter und Klima,** Deutscher Meteorologischer Dienst im Französischen Besatzungsgebiet, Seelbach b. Lahr/Baden, [French Zone, Germany].
★**Wetter und Leben,** Österreichische Gesellschaft für Meteorologie, [Vienna].
★**Zeitschrift für Meteorologie,** Meteorologisches Observatorium, Potsdam, [U. S. S. R. Zone, Germany].

★ Indicates those periodicals which are primarily meteorological.

EXPLANATIONS

Location of material: While it is physically impossible to give for each entry the name of ever library where that item might be obtained, it is possible, by using standard library symbols, to giv the reader some idea of where he might obtain such material. So in most instances a symbol take from the Union List of Serials (Gregory), or the Union Catalogue of the Library of Congress will b given just before the text of each abstract. In some cases where no symbol has been assigned a library, one will be invented by using the general principle of the Union Catalogue list. As a ru the library indicated will be in the District of Columbia, with an occasional reference to one in Ne York or Boston. It will be noted that D stands for District of Columbia, M for Massachusetts an N for New York. Thus **DWB** stands for the U. S. Weather Bureau Library in Washington, D. C and **MH–BH** for the Blue Hill branch of the Harvard Library in Boston, Mass. In the latter cas since the Blue Hill Observatory contains not only the Harvard Observatory Library but that of th American Meteorological Society, the same symbol (**MH–BH**) will stand for either or both librarie

Library symbols: The following abbreviations have been used for Libraries in which the specif material thus indicated in this issue is located:

DA:	U. S. Department of Agriculture Library, Washington, D. C.
DAMS:	Material in hands of American Meteorological Society Abstracts, P.O. Box 173 Washington 13, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
MH:	Harvard University Library, Cambribge, Mass.
MH–BH:	Harvard University, Blue Hill Observatory (and American Meteorological Society Library, Milton, Mass.

Geographical (place) names are in the form generally used internationally, rather than in the for used locally. For instance Vienna is used instead of Wien, Florence for Firenza, Moscow for Mosk and Germany for Deutschland, etc.

Titles of articles or monographs are in the language of the original article unless otherwise state Slavic (Cyrillic) titles are transliterated according to the Library of Congress transliteration schem into the Roman Alphabet.

Entries for **titles of periodicals** are given in the form used on the title page of the periodical providin the title is distinctive (Monthly Weather Review, Meteorologické Zprávy, and Revista Meteo ológica). If the journal is the official organ of a society or institution and the title is not distinctiv as is the case with Transactions, Bulletins, Proceedings, Comptes Rendus, Trudy, Izvestiia, Sitzung berichte, Verhandelingen, Miscellanées, etc., the preferred name of the organization is given firs as part of the title (American Geophysical Union, Transactions; Royal Society of London, Pr ceedings).

Abbreviations and other symbols:

Titles of periodicals are not abbreviated as a rule. Other abbreviations will be used sparing and only when the abbreviation is obvious.

The months of the year from March through July are not abbreviated. Other months a abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec., respectively.

The word or abbreviation for Volume, (Tom, Band, Jahrgang, Año, etc.) and for Numb (Heft, Fascicule, Vypusk) and page or pages is omitted from most entries. Thus an entry will rea as follows:

Meteorologische Rundschau 2(5/6):146–151, May/June 1949.

This indicates that the article was in the Meteorologische Rundschau, Jahrgang 2 (Vol. 2 Heft 5/6 (No. 5 and 6), pages 146–151, Mai/Juni 1949.

The symbol * before an entry indicates a good data source.

The symbol † before an entry indicates a good bibliography source.

The symbol § indicates a synoptic case history study accompanied by charts.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

GENERAL METEOROLOGY

8–1 551.5:016

†König, W., **Verzeichnis zusammenfassender Arbeiten über Wetter und Witterung in Deutschland.** [Bibliography on weather and weather phenomena in Germany.] *Meteorologischer Dienst der Deutschen Demokratischen Republik, Veröffentlichungen*, No. 2, **1950.** 40 p. **MH-BH**—A brief but comprehensive bibliography on papers written in Germany on a large number of subjects (covering the entire field of meteorology). *Subject Headings:* **General meteorology, Bibliographies.**

8–2 551.5(02)

§Berg, Hellmut, **Grundfragen der Wetterkunde.** [Fundamental problems of meteorology.] Stuttgart, Curt E. Schwab, **1949.** 172 p. 49 figs., 8 plates, tables, 22 refs., equations. **DLC**—A pocket sized review of the whole field of meteorology, containing in addition to a chapter on the classical weather elements, discussion of such modern problems as abnormal zones of audibility, meteor trails, ionospheric problems, the outer atmosphere, condensation and freezing nuclei, artificial rain, thunderstorm physics, synoptic meteorology (air masses, fronts, etc.), genetic cloud classification, compensation, solar influences, theory of föhn winds, weather forecasting (short, medium and long range) and others. A two-page review of recent German literature in the field of meteorology lists general works in the field of physics and geophysics, as well as very specific works in limited fields of meteorology. *Subject Headings:* **General meteorology, Textbooks.**—*M.R.*

8–3 551.5:656.6 551.46(02)

§Bossen, P. and van der Zee, P., **Maritieme meteorologie en oceanografie.** [Maritime meteorology and oceanography.] Amsterdam, Kweekschool voor de Zeevaart, **1949.** 312 p. 102 figs., 15 charts. Issued in pocket as appendix, a separate booklet entitled: **Omschrijvingen, codecijfers en symbolen nodig bij invullen van het meteorologisch journaal en de weerkaart op zee.** [Definitions, code ciphers and symbols for use in meteorological logs and weather charts at sea.] 24 p. codes, symbols. **DLC**—A substantial text in the Dutch language, covering the basic principles of meteorology, climatology and oceanography, and even some of the more advanced theoretical aspects which would be of interest to the marine observer or navigator. The greatest attention is payed to storms (hurricanes, cyclones, squalls, etc.), wind systems, (trades, monsoons, doldrums) and to marine observations. This eighth edition contains a supplement giving the details of the latest (Toronto) marine code, and some sample synoptic charts drawn according to recent methods of air mass analysis. *Subject Headings:* **Marine meteorology, Oceanography, Textbooks, Netherlands.**—*M.R.*

8–4 551.5(02)

Meyer, Jerome S., **Picture book of the weather.** New York, Lothrop, Lee & Shepard, [**1948**]. 48 p. numerous drawings in color. **DLC**—An attractively illustrated introductory text on weather (atmosphere, clouds, frost, thunderstorms, hurricanes, tornadoes, fog, etc.) at about the level of students in the sixth grade. Instructions are given for setting up a simple weather station, measuring distance of lightning and amateur forecasting. *Subject Headings:* **Elementary meteorology, Textbooks.**—*M.R.*

8–5 551.5:06(04)

Royal Meteorological Society. **Reports of symposia at Oxford, March 1950.** *Meteorological Magazine, London*, 79(936):173–177, June 1950. 3 refs. **DWB**—Accounts of discussions on—physics of cloud and precipitation; general circulation of the atmosphere; climatic change. *Subject Headings:* **General meteorology, Royal Meteorological Society, Symposia.**

8–6 551.5:61

Berg, Hellmut, **Krankheitsauslösung durch meteorologische und solare Vorgänge.** [Outbreak of disease resulting from meteorological and solar processes.] Stuttgart, Universitas, *Zeitschrift für Wissenschaft, Kunst und Literatur*, 3(10):1195–1204, **1948.** (Reprint available.) **MH-BH**—Effect of changes in air mass on various physiological and pathological processes according to works of de Rudder, Curry, Tichy, Düll, Petersen and others. *Subject Heading:* **Medical meteorology.**—*M.R.*

8–7 551.5:92

†McAdie, Mary R. B., (comp.) **Alexander McAdie; scientist and writer.** Charlottesville, Va., Mary R. B. McAdie, **1949.** 421 p. numerous figs. and photos, list of McAdie's publications, p. 405–431, 2 append. **DLC**—A well-illustrated collection, consisting of 54 selected meteorological articles by Alexander McAdie, photographically reproduced and logically arranged and grouped, together with a short biography or memoir and many tributes from contemporaries. A 17-page classified bibliography of McAdie's writings (1899–1937), show the wide range of interest of this well-known scientist and prolific writer, covering every aspect of meteorology and many other fields of knowledge. There is also a list (and many illustrations) of instruments devised by McAdie. The book was compiled by McAdie's wife with the help of Dr. C. F. Brooks who wrote the original memoir and compiled the extensive bibliography. *Subject Headings:* **General meteorology, Biography, Alexander McAdie.**—*M.R.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

OBSERVATIONS

8–8 551.501:551.57

Carlin, Albert V., **Photographic measurement of amount of cloudiness in the sky.** *American Meteorological Society, Bulletin*, 31(5):180–183, May **1950.** 4 figs., 6 refs., equation **DWB, MH-BH**—Method of computing total sky cover, by means of wide-angle (180°) camera, worked out by author for U. S. Weather Bureau. Measuring mask described. Results compare favorably with estimates of experienced observers (within 1/10). *Subject Headings:* **Methods of observation, Cloud observations, Photography.**—*M.R.*

8–9 551.501.3(02)

Childs, W. H. J., **Physical constants; selected for students.** London, Methuen, [**1949**] Price $1.25. 77 p. **DLC**—A pocket size book containing tables of the most commonly used constants in astronomy, geodesy, mechanics, heat, light, sound magnetism and electricity. Especially useful to the meteorologist are tables or nomograms for hypsometry, barometer corrections, constitution of atmosphere, density of dry air, hygrometry, gas constants, thermodynamics, radiation, emission, refractive indices, etc. *Subject Headings:* **Physical constants, Nomograms, Manuals.**—*M.R.*

8–10 551.501.42:551.52

†Hommel, Karlheinz, **Die Verwendbarkeit des aus Maximum und Minimum gebildeten Temperaturmittels.** [The applicability of the mean temperature from maximum and minimum.] *Meteorologische Rundschau*, 3(3–4):68–73, March–April **1950.** 7 tables, 24 refs. **DWB**—From long-period observations at Geisenheim differences $\frac{1}{2}(\text{Max}+\text{Min})-\frac{1}{4}(\text{I}+\text{I}+2\text{xIII})$ are calculated. They average 0.17°C. with large annual variation; range of individual values up to ±5°C. Correlation of +0.21 between monthly differences and mean daily range. At Feldberg (mountain station) mean difference +0.21°C. The literature is discussed but no simple law is found. *Subject Headings:* **Temperature variations, Germany.**—*C.E.P.B.*

8–11 551.501.4

Pollak, L. W. (asst. by U. N. Egan), **All term guide for harmonic analysis and synthesis using 3 to 24; 26, 28, 30, 34, 36, 38, 42, 44, 46, 52, 60, 76, 84 and 92 equidistant values.** Dublin, Stationery Office, **1949.** 19+p. 5 tables (185 p. of working tables), 4 refs., 27 equations

(Dept. of Industry and Commerce, Meteorological Service, *Geophysical Publications*, Vol. II) **DWB**—A volume giving functions and tables for computing Fourier's or Bessel's series. Also included are the 120 multiplication tables of the author's **Rechentafeln zur harmonischen Analyse,** which makes it unnecessary to use a slide rule or calculating machine in such analyses. *Subject Headings:* **Computation tables, Harmonic analysis.**—*M.R.*

8–12 62.39:551.501.9

Lockemann, W. and Wüsthoff, P., **Das Rundschreibnetz des Deutschen Wetterdienstes in den Jahren 1936–1945.** [The teletype network of the German Weather Service in the years of 1936–1945.] *Deutscher Wetterdienst in the US-Zone, Mitteilungen*, No. 5, Bad Kissingen, March **1950.** 12 p. 7 figs. **MH-BH**—A report on the collection and distribution of synoptic, airways and climatological reports in the U. S. Zone, and the operation of the teletype with special emphasis on verification of reports. *Subject Headings:* **Communication networks, Germany.**—*M.R.*

8–13 551.501.9(99)

Gibbs, W. J., **Meteorology at Heard and Macquarie Islands.** *Meteorological Magazine, London*, 79(936):168–170, June **1950.** 3 photos. **DWB**—Description of establishment of stations on these two sub-antarctic islands by Australian National Research Expedition in Dec. 1947 and April 1948, and their synoptic use. *Subject Headings:* **Observatories, Heard Island, Macquarie Island.**

8–14 551.506.1:551.577

*§Great Britain. Meteorological Office, **British rainfall 1946. Report on the distribution of rain in space and time over Great Britain and Northern Ireland during the year 1946 as recorded by about 5,000 observers.** London, H. M. Stationery Office, **1948.** 214 p. numerous charts, tables. **British rainfall 1947.** London, H. M. Stationery Office, **1949.** 203 p. numerous charts, tables. **DWB**—Up to 1939, the British Rainfall Organization had published 65 annual volumes—in the last few years they had become of considerable proportion, with a section devoted to research papers, in addition to the three sections containing the actual data and its analysis. The 1946 volume (the first since 1939) retains all of the essential data arranged much as before, for the sake of continuity, but greatly condensed in order to save paper. The 1947 volume follows the same style as 1946, but the data for the interim years: 1940–1945, will be published in two volumes (1940–1942, and 1943–1945) in an even more condensed form. The 1946 and 1947 volumes contain data for about 5,000 stations in England, Scotland, Wales and Northern Ireland arranged by districts and river basins in each district. *Subject Headings:* **Rainfall data, Yearbooks, Great Britain, Ireland.**—*M.R.*

8–15 551.506.3:551.521.1:551.573(611)

*Viguier, Louis, **Actinometrie, insolation, évaporation; période 1927–1948.** [Actinometry, insolation, evaporation; period 1927–1948.] Service Météorologique, Tunis. 12 leaves. 12 tables. **MH-BH**—A mimeographed statistical summary of observations made at Tunis during a period of 22 years. Includes monthly total, maximum, minimum and mean values of solar radiation, expressed in cm^3 of alcohol condensed (Six and Ballini instruments); of insolation made with a Campbell sunshine recorder (hours/month); and of evaporation (mm.) made with a Piche evaporimeter. *Subject Headings:* **Actinometric data, Sunshine data, Evaporation data, Tunis.**—*M.R.*

INSTRUMENTS

8–16 551.507.321.2:551.501.7

Droessler, Earl G., **"Skyhook" plastic balloons for high-altitude soundings.** *American Meteorological Society, Bulletin*, 31(6):191–193, June **1950.** 2 figs., 2 refs. **DWB, MH-BH**—Description of construction, performance, and observations made with the nonstretchable, polyethylene balloon (129' long; 73 ft. in diameter and carrying 80 pounds of "payload"). Data on winds, temperature, humidity, ozone, solar spectrum, cosmic rays, etc., up to 100,000 feet have been collected and experience gained has been valuable in developing constant level

balloons. *Subject Headings:* **Sounding balloons, Constant level balloons, Upper air observations.**—*M.R.*

8–17 551.508.21:551.521.1:551.508.822

de Pasquale, Oreste, **I methodi dell'attinometria classica e la possibilità di effettuare misure d'intensità della radiazione solare mediante le radiosonde.** [The classical methods of actinometry and the possibility of measuring the intensity of solar radiation by means of the radiosonde.] *Rivista di Meteorologica Aeronautica*, 9(2):38–45, April–June **1949.** 2 figs., refs., equations. **MH-BH**—Various types of actinometers are considered in respect to application of the most practicable type (Ångström-Chivalson) to a modification of the ordinary radiosonde (Diamond-Hinman for instance). The advantages in using the radiosonde, rather than mountain observatories, for obtaining measurements of total radiation on a horizontal surface in the high atmosphere, are emphasized; and difficulties in making adaptations to instruments and circuits, discussed. *Subject Headings:* **Actinometry, Solar radiation, Radiosondes, Italy.**—*M.R.*

8–18 551.508.2

Gerhardt, J. R., **A simple integrating device for the routine statistical analysis of recorded data.** *American Geophysical Union, Transactions*, 31, part 1, (2):183–186, April **1950.** figs. **MH-BH**—An ingenious device for recording duration-frequency of occurrences of meteorological parameters in certain class intervals without long and complicated calculations is described and illustrated. For micrometeorological studies of temperature, a series of ten electric clocks hooked up to a commutator similar to those used in radiosondes, indicates percentage of time temperature remains in any one of ten .5°C. intervals. Very sensitive to sudden changes and easily transcribed. *Subject Headings:* **Recording equipment, Statistical analysis, Temperature instruments.**—*M.R.*

8–19 551.508.5

Hartley, G. E. W., **How to make an anemometer.** *Weather*, 5(6):203–206, June **1950** 17 diagrams. **DWB**—Describes and illustrates construction of an electric contact cup anemometer from simple materials. *Subject Heading:* **Anemometers.**

8–20 551.508.7

*Prudhomme, André, **Recherches sur un nouveau procédé hygrométrique.** [Research on a new method of hygrometry.] *Annales de Géophysique*, 5(4):293–309, Oct.–Dec. **1949** 8 figs., tables, 12 refs., equations. Summary in French and English p. 293. **MH-BH**—Data from two sets of experiments made by the author to determine the actual amount of water contained in the air, whether in solid, liquid or gaseous state, are presented in detail and the equipment and methods described and illustrated. The heat produced by absorption of water by H_2SO_4 is used as the parameter. Results compared with those obtained by the psychrometric method. Possibilities for more accurate measurement of water in clouds and application to radiosonde discussed. *Subject Headings:* **Hygrometry, Sulphuric acid hygrometers.**—*M.R.*

8–21 551.508.82

Schulze, Rudolf, **Zum Einsatz der Radiosonde in der Meteorologie. I. Mitteilung Aufgaben und Forderungen, Typisierung.** [On the part played by the radiosonde in meteorology. Part I. Results and requirements. Specifications.] *Annalen der Meteorologie, Beiheft*, **1950.** 29 p. 17 figs., 13 tables, refs. **MH-BH**—A valuable comprehensive study of the present efficiency and possible developments of radiosondes. The ranges and accuracy at present attainable are: temperature +40 to −70°C., error ±0.5°C.; humidity 0 to 100%±5%; pressure 1100 to 15 mb.±5 mb.; wind, altitude and azimuth ±5° to a distance of 150±0.2 km. Temperatures to −90°C., pressures to 5 mb. and wind to 180 km., with greater accuracy should be aimed at. Errors in calculated heights range up to 750 gdm. at 50 mb., errors in absolute topography up to 50 gdm. at 41 mb. Effect of errors in distance with various methods of measurement in calculated winds are discussed. "Temperature sondes" (temperature, humidity, pressure) are of four types: mechanical senders (time, indicator signals), electrical

senders (modulation, frequency); 21 forms are listed with notes and diagrams. Wind sondes include: active (bearing only; phase sondes with direct determination of distance) and passive (optical by theodolite; high-frequency reflectors of various types). Characteristics of both "temperature" and wind sondes are set out in tables. The memoir ends with sections on rocket sondes and automatic reporting stations on land and sea (anchored and drifting). *Subject Headings:* **Radiosondes, Rocket soundings.**—*C.E.P.B.*

8–22 551.508.98

†Wachter, Heinz, **Über die Auswertung frigorigraphischer Messungen. (Berücksichtigung der nicht-stationären Messbedingungen.)** [On the evaluation of frigorigraphic measurements; consideration of non-stationary conditions of measurements.] *Meteorologische Rundschau*, 3(1–2):7–10, Jan.–Feb. 1950. 2 tables, 27 refs., 3 equations. **DWB**—The various instruments for measuring cooling power are classified according to the physical processes utilized (initial, constant or regulated heating). It is shown that the surface temperature of a constant-heated sphere generally corresponds with a variable heat-loss because of the natural variability of meteorological elements. If in addition to the temperature of the sphere the rate of change dT/dt is measured, the loss of heat can be evaluated. By using two spheres differing only in heat capacity, cooling by radiation and by conduction-convection can be calculated separately. *Subject Headings:* **Heat losses, Meteorological instruments.**—*C.E.P.B.*

SYNOPTIC ANALYSIS AND FORECASTING

8–23 551.509.3:551.575

Mook, Conrad P., **Some remarks concerning Taylor's fog prediction diagram.** *American Meteorological Society, Bulletin*, 31(6):206–209, June 1950. 9 figs., 6 refs. **MH-BH**—Taylor's famous diagram for predicting fog, which was based on plotting cases of fog and no fog at Kew on coordinates of 8 p.m. temperature and dew point depression, and separating the bulk of cases by a line which yielded a *fog not expected*, and a *fog expected* area, is refined by drawing lines of *fog frequency* (25%, 50% and 75% expectancy). These lines take on a much different shape than Taylor's, and are more reliable. They indicate that along a line of constant dew point depression, the percentage frequency of fog **decreases** *above* 50°F. and *below* 40°F. at Kew. The cause is considered by independent theoretical analysis based on Brunt's minimum temperature formula and Petterssen's *Mist Interval*, suggesting a re-drawing of Taylor's prediction line. *Subject Headings:* **Objective forecasting, Fog forecasting, Taylor diagram.**—*M.R.*

8–24 551.509.317:551.577

§Beebe, Robert G., **Forecasting winter precipitation for Atlanta, Ga.** *Monthly Weather Review*, 78(4):59–68, April 1950. 8 figs. (including 4 synoptic charts), 2 tables, 3 refs. **DWB, MH-BH**—Moisture, temperature advection and flow pattern data for two winters (1945–1947) for the 850 and 700-mb. levels are used as parameters for preparing forecast graphs which have proven, by checking against independent data (2 winters), to increase the accuracy and decrease the large errors in rainfall forecasts for the Atlanta area. Other variables were tested with less success. Cases divided into those with strong and those with weak gradients. *Subject Headings:* **Objective forecasting, Rainfall forecasting, Atlanta.**—*M.R.*

8–25 551.509.31:551.578

Gentry, Robert C., **Forecasting local showers in Florida during the summer.** *Monthly Weather Review*, 78(3):41–49, March 1950. 11 figs., 3 tables, 9 refs. **MH-BH**—Records show that there is a shower somewhere in Florida nearly every day in summer. Hence, the forecast "scattered showers" which is most frequently issued, is generally accurate but meaningless. By analyzing rainfall records for five years from 10 stations in a radius of 25 miles from Miami, and correlating various categories of shower density on given days with other parameters (relative humidity, proximity to 700 mb. trough or ridge, curvature of upper level contours, location of nearest easterly wave or tropical storm, and general trajectory of air approaching Miami) it was possible to construct forecast graphs or nomograms which allow issuance on a rational basis of forecasts indicating the actual percentage probability of a shower near Miami. Data for 5 months were checked against five months of independent data, showing skill score

of 55 or that the forecasts were correct 86% of the time. *Subject Headings:* **Rainfall forecasting, Objective forecasting, Miami, Florida.**—*M.R.*

8–26 551.509.312:551.515

§Staude, Rudolf, **Über Formveränderungen und Achsenbewegung von 24-stündige Bodendruckänderungsgebieten und deren Lage zum Frontenverlauf erläutert an einige besonders markanten synoptischen Entwicklungen.** [On changes of shape and axial mov ments of 24-hour surface isallobars and their position in relation to the course of fronts illu trated by some specially striking synoptic developments.] *Annalen der Meteorologie*, 3(4):84–91, **1950.** 21 figs. Summaries in German and English p. 84. **DWB, MH-BH** Besides their well-known changes of intensity, 24-hour isallobars of depressions show characte istic changes of shape. The major axes of the central ellipses of rising and falling pressu rotate counter-clockwise as the depression ages and becomes occluded. The axis of t negative isallobars is parallel to the cold front or occlusion; changes of positive isallobars a smaller and less definite. The phenomena are related to circular steering by the upper lo Examples are shown for west Europe and east Atlantic. *Subject Headings:* **Synoptic analysi Steering, Barometric depressions.**—*C.E.P.B.*

8–27 551.509.33:519

Baur, Franz, **Über falsche und richtige Statistik in der Meteorologie.** [On false and tru statistics in meteorology.] *Annalen der Meteorologie*, 3(3–4):74–83, **1950.** 3 figs., 5 table 12 refs., equation. Summaries in German and English p. 74. **DWB, MH-BH**—Author claim that Rodewald's synoptic argument, that a great fall of pressure in Norwegian Sea in Oct.–No followed by a great rise in Nov.–Dec. presages a severe winter in Central Europe, is unsoun Data for 178 years gave correlation coefficients between winter temperature of Central Euro and preceding pressure changes at Edinburgh: Oct.–Nov., +.05, Nov.–Dec. −.36. B changes of temperature Oct.–Nov. at Surgut and Tomsk gave correlation of +.63 (1885–193 with following winter in Central Europe, showing that relation with Siberian cold pool closer. Other examples show need for detailed statistical investigations, especially into t recurrence of persistent anomalies of west-east zonal circulation. *Subject Headings:* **Lon range forecasting, Statistics in meteorology, Correlation coefficients.**—*C.E.P.B.*

8–28 551.509.3

Müller-Annen, Hans, **Über den statistischen Hintergrund der Singularitäten. (Unter suchungen, Gedanken und Methoden zur Langfristvorhersage. 4 Beitrag.)** [On t statistical background of singularities. (Investigations, ideas and methods of long rang forecasting. 4th contribution.] *Annalen der Meteorologie*, 3(3–4):107–115, **1950.** 3 figs 11 refs. Summaries in German and English p. 107. **DWB, MH-BH**—Bartels has shown tha the occurrence of singularities gives nearly as much scatter as if they had no relation to t calendar. Author finds that only singularities in annual variation of heavy hailstorms can b regarded as real (Lexis divergence coefficient $Q = 1.23 \pm .06$; Q for accidental variation 1.0 The dates of singularities may differ by up to 14 days from assigned date, making them little forecasting value. The causes of such fluctuations. and the length of intervals betwee opposite types (due to atmospheric oscillations) need investigation, also occurrences of s quences of singularities. *Subject Headings:* **Long range forecasting, Singularities.**—*C.E.P.B*

8–29 551.509.67:551.57

Cloud seeding works in California. *Electrical World*, 133(11):70–72, March 13, 195 5 photos. **DLC**—California Electric Power Co. has conducted experiments for two years i the Bishop Basin (High Sierras), using dry ice to seed cumulus clouds 21 times, with an e timated increase in available water supply (snow) of 14% in 1948 and 12% in 1949. Series cloud photographs show rapid results obtained from one seeding operation. Chart show relief of valley. *Subject Headings:* **Cloud seeding, Water supply, California.**—*M.R.*

8–30 551.509.6

Staub, H., Thams, I. C., and Zenone, E., **Die Organisation des Grossversuches zu Bekämpfung des Hagels in der Magadino-Ebene.** [Organization of a large scale attempt t

control hailstorms in the Magadino plain.] *Schweizerische Landwirtschaftliche Zeitschrift*, No. 41:1113–1124, Oct. 14, 1949. 5 figs. **MH-BH**—An elaborate hail warning system was set up to the rich mountain valley above Locarno, and attempts at control of hailstorms by rockets (hail shooting) described and illustrated. Comprehensive reports of weather conditions, shooting and effectiveness (damage as estimated by the Swiss Hail Insurance Society) are made each time. Results inconclusive as yet. *Subject Headings:* **Hail shooting, Hail warning network, Switzerland.**—*M.R.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

STRUCTURE OF THE ATMOSPHERE

8–31 551.510.53:551.524.7:551.547

†*Grimminger, George, **Project Rand; analysis of temperature, pressure, and density of the atmosphere extending to extreme altitudes.** Santa Monica, Calif., Rand Corp., Nov. 1, 1948. 49 p. 44 figs., 45 tables, 108 refs., 94 equations. **DLC**—A compilation, mainly in tabular and graphic form, of the present knowledge of the structure, composition, temperature and density of the atmosphere in two major zones: below the F_2 layer, and above the F_2 layer. Three models are presented for the upper stratosphere, depending on the concept of motion of individual particles in the atmospheric gas; that is whether the particles have a limited, a large mean free path, or a completely free path or orbit. In discussing the exosphere, special attention is given to the height of its base, the idea of *diffusion equilibrium* and the limit of the atmosphere. *Subject Headings:* **Atmospheric structure, Upper stratosphere, Exosphere.**—*M.R.*

8–32 551.510.535

†Jouaust, Raymond, **Les études récentes sur l'ionosphère.** [Recent studies on the ionosphere.] *Annales de Géophysique*, 5(4):325–330, Oct.–Dec. **1949.** 46 refs., equations. **MH-BH**—A review of investigations on the D and F layers, on deformations of the ionosphere, observations during eclipses, the effect of solar radiations on the ionosphere, the relation between the ionosphere and terrestrial magnetism, ionospheric forecasts, the formation of the layers and other theoretical studies made between 1942 and 1949. Literature cited. *Subject Heading:* **Ionosphere.**—*M.R.*

8–33 551.510.535

†Nicolet, M. and Bossy, L., **Sur l'absorption des ondes courtes dans l'ionosphère.** [On the absorption of short waves in the ionosphere.] *Annales de Géophysique*, 5(4):275–292, Oct.–Dec. **1949.** 4 figs., 2 tables, 19 refs., 55 equations. **MH-BH**—A theoretical study of the structure of the stratosphere in the E and D layers, including the probable temperatures, absorption and ionization in such variable layers, and variation of absorption of high frequency waves with varying zenith distance of the sun. The amount of dissociation of O_2 in the two layers is calculated. *Subject Headings:* **Ionospheric structure, Absorption of radiation.**—*M.R.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

8–34 551.511

Finck, J. L., **On metastable states of equilibrium in thermodynamics.** *Franklin Institute, Journal*, 243(1):1–12, Jan. **1947.** 2 figs., 3 refs., 29 equations. **DWB, DLC**—The author modifies the classic theory of thermodynamics with respect to reversibility of processes; maintaining that a system must be defined before the question of reversibility can be considered. That is, the actual independent variables must be known mathematically and the transformations including all chemical reactions within a single phase (dissociation, ionization), evaporation, crystallization, etc., understood. *Subject Heading:* **Thermodynamics.**—*M.R.*

8–35 551.511

Lombardini, Maria, **Le curve di inerzia generalizzate.** [The generalized curves of inertia.] *Rivista di Meteorologia Aeronautica*, 9(2):3–26, April–June **1949.** 3 figs., 13 equations. **MH-BH**—The equations of motion are developed for a plane and then for a spherical earth, and

are expanded to satisfy the case of permanent horizontal atmospheric motion with zero diver gence. The curves which result are called *the generalized curves of inertia*, and illustrate th conservation of vorticity. The cyclonic and anticyclonic curves are reproduced on a bas which would correspond to the North Atlantic (from 30° to 60°N), and quantitative values ar given in tables. *Subject Headings:* **Mechanics of the atmosphere, Vorticity.** —*M.R.*

8–36 551.511:532.5(02

Kochin, Nikolai E., **Gidrodinamika i aerodinamika.** [Hydrodynamics and aerc dynamics.] **Sobranie sochineniĭ,** Tom II. [Collected works, Vol. II.] Moscow, Izdatel stvo Akademii Nauk, SSSR, **1949.** 586 p. numerous figs., and equations, biblio., photo c Kochin. **DLC**—A major theoretical treatise on wave motion in gases and liquids, both i confined and free spaces, along boundary layers and in stratified media. Great stress is place on shock waves in ideal fluids, and other recent problems of aerodynamics, as well as the mor classical problems of hydrodynamics. Boundary layer theories developed by French, Germa and Russian mathematical physicists working in this field, are reviewed. Not a meteorologica work; but presents theory basic for meteorologists, written by a meteorologist. *Subje Headings:* **Hydrodynamics, Aerodynamics, Textbooks.**—*M.R.*

8–37 551.511:532.5(02

Milne-Thomson, L. M., **Theoretical hydrodynamics.** 2nd ed. New York, MacMillar **1950.** 600 p. numerous figs., 4 plates, refs., equations. **MH-BH**—This classical textbool which began as a series of lectures to the Royal Corps of Naval Constructors at Greenwicl has been materially revised and enlarged. The book is outstanding in its rational and thorougl treatment of the mathematical theory of fluid motion as applicable to hydrodynamics an aerodynamics, and incidentally to meteorology and oceanography. The exclusive use c vector methods throughout does not mean that a knowledge of higher mathematics (beyon calculus) is necessary to follow the developments. Beginning, naturally, on the theorems c Bernoulli, Stokes, Gauss and Green, the author plunges right into the basic concepts of dynam meteorology. The equations of motion, or continuity, pressure, energy, vorticity, two-dimer sional motion, complex variables (La Place), streamlines, sources and sinks, jets and current Helmholtz motions, stationary waves, long waves, tides, surface waves, stream function vortex motion, viscosity, thermodynamics, etc., are treated in detail. *Subject Heading* **Hydrodynamics, Textbooks.**—*M.R.*

8–38 551.511(02

Van Mieghem, Jacques and Dufour, L., **Thermodynamique de l'atmosphère.** [Thermc dynamics of the atmosphere.] Brussels, **1949.** 247 p. 20 figs., tables, refs., numerous equa tions. **MH-BH**—The first six chapters of this substantial volume take up systematically th general theories of thermodynamics as applied to change of state of water vapor in close systems and then in open systems. This part of the book is based essentially on a text b Van Mieghem published in 1943. The last four chapters of the present work are concerned wit applications of the theory to changes in the troposphere. First the characteristics and tran formation which occur in dry (non-saturated) air are taken up in detail; then a chapter devoted to conditions in aqueous clouds and non-precipitating ice clouds; then colloidall unstable clouds of water or ice (precipitating) and finally a discussion of various aerologica diagrams and the calculations which are involved (by M. P. Defrise). All the many symbo and constants employed in this work are carefully tested and defined, with reference to th decisions of the I. M. O. made at Toronto and Washington (1947). *Subject Headings:* **Thermc dynamics of the atmosphere, Aerological diagrams, Textbooks.**—*M.R.*

GENERAL CIRCULATION

8–39 551.51

§Riehl, H., Yeh, Tu-cheng, and La Seur, N. E., **A study of variations of the general circula tion.** *Journal oj Meteorology*, 7(3):181–194, June **1950.** 21 figs. (including 3 synoptic charts 2 tables, 13 refs. **DWB, MH-BH**—An attempt is made to show the effect of the tropics on th general circulation in higher latitudes, and the relative importance of the 700 and 300 mb

levels as representative of the lower and upper troposphere, respectively. Seasonal trends in the zonal and meridional flow were studied for over two years (1945–1947), and among other results it was noted that there are gradual and consistent (for spells of 4–6 weeks) drifts of zonal momentum across the latitude circles (usually but not always from the equator *toward* high latitudes); and these bands of momentum, sometimes intense and sometimes feeble, can be traced for as long as a month. A synoptic example illustrates the weather which resulted from such a travelling momentum band (Oct. 14–31, 1945). *Subject Headings:* **General circulation, Energy transport.**—*M.R.*

8–40 551.513:551.501.7

§Vederman, Joseph and Smith, Clarence D., Jr., **The winter mid-troposphere circulation near the North Pole.** *American Meteorological Society, Bulletin*, 31(6):197–205, June **1950.** 7 figs., 13 refs., equations. **DWB, MH-BH**—Analysis of 750 observations made at ½ hourly intervals on 40 flights, of which 31 reached the North Pole, give data for construction of the first accurate charts of mean height of the 500 mb. surface over the Arctic Ocean between Point Barrow and the Pole. Extreme variations (2,810 ft.) are noted in height of the isobaric surface, but not so much range in temperature (19°C.) compared with Ely, Nevada (1,630 ft. and 27°C. respectively). Heights and temperatures are lower than at Barrow, but the gradient is less than over the continent, and even lower temperatures are found at Eureka Sound, Canada, than at the Pole. Winds are weak and predominantly westerly. Individual flights are analyzed and illustrated by cross sections and synoptic charts; and the whole is tied in with theories of the general circulation and the best existing models of pressure over the Arctic. *Subject Headings:* **General circulation, Upper air observations, North Pole.**—*M.R.*

8–41 551.513.1:551.52

Möller, Fritz, **Die Wärmebilanz der freien Atmosphäre im Januar.** [The heat balance of the free atmosphere in January.] *Meteorologische Rundschau*, 3(5–6):97–108, May–June **1950.** 8 figs., 4 tables, 39 refs., 8 equations. **DWB, MH-BH**—The heat balance in the lowest 3 km. is calculated from temperature gradient and vector mean wind, and large-scale horizontal *austausch.* The method of calculating the latter uses vector mean wind and its ratio to the scalar mean, and the ratio of geostrophic or upper winds to surface wind and monthly range of pressure. By these means a chart of *austausch* in January is constructed for Northern Hemisphere from 30°N. to the Pole. Author then constructs for the same area a chart of mean January temperature between 0 and 3 km. These give the horizontal *austausch* heat currents. Advection is calculated from distribution of pressure and temperature. The net gain or loss of heat by both advection and *austausch* is then shown on a similar chart (unit, cal/cm²/min., values from +0.4 off Korea to −0.3 in Siberia). Cooling is 3–4° a day over continents and similar warming over warm currents. The complicated chart is discussed in detail. Finally, zonal means are shown of gain or loss of heat by advection and *austausch*, radiation balance and heat of condensation (from mean rainfall). The values require vertical movements of about 0.2 m./sec. *Subject Headings:* **Thermodynamics of the atmosphere, Energy exchange.**—*C.E.P.B.*

8–42 551.513.1

Priestly, C. H. B., **Flow of momentum and mass across the high pressure belt of the earth's atmosphere.** *Nature, London*, 165(4204):855–856, May 27, **1950. DLC**—The atmospheric angular momentum generated at surface between two latitudes must be balanced by equivalent outflow. This is partly effected by mean polar drift at some levels and equatorward at others. The mean magnitude required is only a few miles per hour; at the surface in latitude of maximum pressure there is an observed equatorward drift of 2 m.p.h. Release of angular momentum occurs in bursts in wanderings of jet stream and these regenerate zonal circulation. *Subject Headings:* **General circulation, Energy transport.**—*C.E.P.B.*

ATMOSPHERIC DISTURBANCES

8–43 551.515.1:656.6

§Shaw, P. M., **The disappearance of the "Samkey."** *Marine Observer*, 20(147):45–48, **Jan. 1950.** 2 figs. **DWB**—Ship disappeared in mid-Atlantic Jan. 31, 1948, in deep depression, probably through shifting of ballast. *Subject Headings:* **Gales, Marine disasters.**

8–44 551.515.2

§Sawyer, J. S. and Ilett, Betty, **When hurricanes come north.** *Weather*, 5(6):210–217, June **1950.** 5 figs., table, 4 refs. **DWB**—Tannehill's tracks of hurricanes 1901–39 were extended into temperate latitudes; 31% reached N.E. Atlantic. Analyzed by 10° squares with speed in knots and time taken. Transformation into extratropical depressions shown by synoptic charts. Behavior and interaction with polar front described. *Subject Headings:* **Hurricane tracks, North Atlantic.**

8–45 551.515.23

Black, A. A., **Extraordinary track of a cyclone.** *Weather*, 5(6):229–230, June **1950.** fig. **DWB**—Tracks of two cyclones in Feb. 1950 shown, one down coast of Mozambique, the other right across Africa in 15–20°S. lat. *Subject Headings:* **Cyclone tracks, Mozambique.**

8–46 551.515.23

§Emon, Jean, **Le cyclone tropical destructeur des 26 et 27 janvier 1948 à la Reunion.** [The destructive tropical cyclone of January 26 and 27, 1948 at Reunion.] *Madagascar, Service Météorologique, Publication*, No. 12, Oct. **1948.** 31 p. 12 sheets. 2 tables, 2 barograms, 10 charts, 4 photos, 11 refs. **DWB**—A detailed analytical account of the tropical cyclone which moved southward in the Indian Ocean from the 23rd to the 28th of January 1948, passing close to Reunion (minimum pressure 971 mb. at St. Pierre, at 3 A.M. Jan. 27) causing the loss of 165 lives and 4½ billion francs in property. Although 20 other hurricanes are listed as involving lower pressure at Reunion, and several resulted in greater loss of life, none have produced more property damage. The meteorological situation from the point of view of the difficulties in forecasting such a destructive cyclone, when indications were that it would be a mild disturbance, is presented and supported by numerous synoptic charts and barograms, as well as photographs of damage. *Subject Headings:* **Tropical cyclones, Reunion Island, Indian Ocean.**—*M.R.*

8–47 551.515.41

†Bleeker, W. and Andre, M. J., **Convective phenomena in the atmosphere.** *Journal of Meteorology*, 7(3):195–209, June **1950.** 18 figs., table, 34 refs., 6 equations. **DWB, MH-BH**—Detailed data from 62 surface stations collected by the Thunderstorm Project in a 10 mile square at Wilmington, Ohio have been used to set up simple models and attempt to explain such convective phenomena as dry convection, cumulus circulation and thunderstorm dynamics. Elaborate charts of perturbation pressure and wind fields for each half hour during the development and progress of a thunderstorm (August 25, 1947) are drawn to show the changes in surface circulation patterns under a cumulus and cumulonimbus. The *pressure jump* and thunderstorm high are explained as due to strong cooling by precipitation. A scatter diagram shows the relation between amount of pressure rise and rainfall during a thunder squall to be almost linear. "Organized" convection is also discussed. *Subject Headings:* **Convection, Thunderstorm dynamics.**—*M.R.*

8–48 551.515.41

†§Newton, C. W., **Structure and mechanism of the prefrontal squall line.** *Journal of Meteorology*, 7(3):210–222, June **1950.** 20 figs. (including 12 synoptic charts), 27 refs. **DWB, MH-BH**—Analysis of surface and upper air data obtained by the Thunderstorm Project during passage of squall lines (May and Sept. 1947), shows that such thunderstorm lines move more rapidly than the surface cold front, but a surface cold front always exists at the leading edge of the thunderstorm area. Structure and dynamics of this process (convection, cooling by precipitation and transfer of momentum upward or downward as the case may be) are discussed and illustrated by diagrams and cross sections. Case histories are treated for the whole eastern part of the U. S. A., with comments on formation of squall lines on stationary fronts or in non-frontal areas, preference for afternoon or evening hours, etc. *Subject Headings:* **Thunderstorm dynamics, Line squalls, Synoptic-aerological studies, United States.**—*M.R.*

8–49 551.515.8(988)

†Matthes, François E. and Belmont, Arthur D., **The glacial anticyclone theory examined in the light of recent meteorological data from Greenland—Part 2.** *American Geophysical*

Union, Transactions, 31, part 1, (2):174–182, April 1950. fig., 28 refs. **DWB**—Evidence collected before his death by Matthes (in the form of notes), edited and arranged by Belmont, shows that although cyclones are frequently diverted by Greenland to the west or east, they occasionally cross the ice cap both in summer and winter. Records made at Eismitte (1930–1931) by the Germans, and by two British expeditions (1930–1931 and 1934) across the ice cap, indicate that bad weather occurs over half of the time, and that the sequence of events (cloud, wind, precipitation, temperature) is not appreciably different from that which occurs elsewhere when cyclones pass. The outflowing of cold air which Hobbs cites as proof of a glacial anticyclone is only a very thin skin of cold air and prevents (rather than proves) the formation of an anticyclone. Other arguments presented to refute Hobbs theory: passage of deep cyclones over other and higher mountain masses, depth of snow falling on ice cap many times greater than would occur from anticyclonic alimentation of ice crystals. *Subject Headings:* **Glacial anticyclone, Cyclones, Greenland.**—*M.R.*

8–50 551.515.8:551.509.318

§Schregardus, M. W. F. and Bierman, M., **Een overtrekkende Slechtweerzone op Java.** [A passing bad-weather zone at Java.] *Chronica Naturae*, [Djakarta-Pusat], 106(2): Feb. 1950. 12 figs., 3 refs. **DLC**—Synoptic, climatological and aerological analysis of a cold-front situation (May 29–June 2, 1949), which caused bad weather along the coasts of Java. The front moved from the Indian Ocean toward Java from the southwest (reported by Dutch Weather Ship *Aer Mas* on May 30), and had many characteristics of an extratropical cold front. Four detailed isohyetal charts show rainfall over Java on four days (May 31–June 2). *Subject Headings:* **Cold fronts, Synoptic-aerological studies, Java.**—*M.R.*

8–51 551.515.8:551.524.35

Schindler, G., **Eine Warmsektorspitze im Thermogramm.** [A warm sector peak in the thermogram.] *Zeitschrift für Meteorologie*, 3(1–2):49, Jan.–Feb. 1949. fig. **DWB**—Jan. 19, 1941 at Podersam; rise of 10°C. *Subject Headings:* **Warm fronts, Temperature variations, Germany.**

RADIATION AND TEMPERATURE

RADIATION

8–52 551.521:69

Hand, I. F., **Insolation on clear days at the time of solstices and equinoxes for latitude 42°N.** *Heating and Ventilating*, 47(1):92–94, Jan. 1950. 3 figs., 2 tables. (Reprint available). **DWB**—Tables and graphs show hourly values of insolation for various exposures (vertical, horizontal, normal and diffuse and facing different directions), on the 21st of March, June, Sept. and Dec. at 42°N. Also variations in energy received at noon on cloudless days given for average and for actual dates (1947). *Subject Headings:* **Insolation, Building design.**—*M.R.*

8–53 551.521.1:69

Everetts, John, Jr., **The role of climatology in air conditioning design.** *Heating and Ventilating*, 47(3):73–76, March 1950. 2 photos., 4 tables. **DLC**—The effect of solar radiation and heat storage on heating or cooling load, especially with different facing walls of homes, factories and theaters under different climatic conditions (Chicago, St. Louis and New Orleans), are discussed and illustrated. Value of climatic data stressed. *Subject Headings:* **Solar radiation, Industrial climatology, Heating and ventilating, Building design.**—*M.R.*

8–54 551.521.1:551.510.535

Penndorf, Rudolf, **Absorption of solar energy by oxygen molecules in the E-layer.** *Journal of Meteorology*, 7(3):243–244, June 1950. fig., 2 refs., equation. **MH-BH, DWB**—*Subject Headings:* **Solar radiation, Ionospheric composition.**

8–55 551.521.2 551.525:551.58

Fleagle, Robert G., **Radiation theory of local temperature differences.** *Journal of Meteorology*, 7(2):114–120, April **1950.** 7 figs., 15 refs., 27 equations. **DWB, MH-BH**—The theories of radiational cooling advanced by Brunt, Wexler and Groen are extended for the special case of obstructions (such as valley walls, trees, clouds [or buildings]) extending above the horizon, and for varying thickness of the ground surface layer. The rate of cooling and the minimum possible temperature in the absence of insolation are computed and curves shown for various types of surface and environment: ice covered river, light snow cover, compact snow cover, bare granite, obstructed horizon and clear horizon. Differences of 20°C. between the extremes (ice-covered water and snow-covered terrain) are possible in a short distance. Obstructions reduce rate of cooling. *Subject Headings:* **Radiational cooling, Topographic effects, Minimum temperature forecasting, Micrometeorology.**—*M.R.*

8–56 551.521.64 537.5

Lock, W. O. and Muirhead, H., **Cosmic rays, Part I. Soft and hard radiation.** *Weather* 5(4):133–137, April **1950.** 3 figs. **Part II. Mesons,** *ibid.*, 5(5):172–175, May **1950.** 3 photos. **DWB**—Pt. I describes method of investigating cosmic radiation by ionization, discovery of soft and penetrating components by thickness of lead penetrated. Pt. II describes theory and observation of positive and negative mesons of two types, π(286 times mass of electron) decaying to μ(216 m_e) which decay to electrons. Life of π mesons 1.2×10^{-8} seconds. A heavier particle κ is about 1000 m_e decaying into 3 charged mesons. Penetrating showers also described. *Subject Heading:* **Cosmic radiation.**

8–57 551.521.

*Dufay, Jean and Tcheng, Mao-lin, **Recherches sur les spectres des éclairs. Première partie, Étude des spectres, de 3830 à 6570 Å, au moyen de spectrographes à fente.** [Research on lightning spectra. Part I, Study of spectra, from 3830 to 6570 Å, by means of "slit" spectrographs.] *Annales de Géophysique*, 5(2):137–149, **1949.** 4 figs., 2 tables, 9 refs. Dufay, Maurice, **Deuxieme partie, Étude du spectre dans les régions violette.** [Part II, Study of the spectra in the violet region.] *Ibid.*, 5(4):255–263, Oct.–Dec. **1949.** 3 figs., 3 tables, refs. **MH-BH**—For a number of years the observatories at Lyon and Haute-Provence have photographed the spectra of lightning with two types of spectrometers: slit and prismatic. The first article deals with the results of measurements of 80 bands between 3830 and 6570 Å. The second article takes up the measurements of a large number of bands in the UV (3800 to 2900 Å), made by M. Dufay at Haute-Provence with a quartz optical spectrograph. A third article deals with measurements made with a prism objective spectrograph. The bands in the first case were mostly from N(I), O(I), N(II) and H. In the second (ultraviolet) set of measurements, the most intense bands were those of N_2^+ and N_2(2P), and 3064 Å band of OH. Absorption by ozone limits the spectra in the direction of the ultraviolet. The amount of ozone produced by a thunderstorm discharge is estimated. A detailed presentation of data in tabular and graphic form is included in these articles. *Subject Heading:* **Lightning spectra.**—*M.R.*

TEMPERATURE

8–58 551.52

*Manig, Marianne, **Monatsmittel der Lufttemperatur in Deutschland für die Periode 1881–1940. Teil I, Süddeutschland, Hessen.** [Monthly mean temperature of air in Germany in the period of 1881–1940. Part 1, South Germany, Hesse.] *Deutscher Wetterdienst in der US-Zone, Mitteilungen*, No. 4, Bad Kissingen, March **1950.** 31 p. 12 charts, 2 tables. **MH-BH**—In addition to data from stations in the U.S. Zone of Germany, the methods of analysis of the data are described; and a comparison of temperature taken through windows of houses and in shelters in open country, given for nine stations (for 1–4 years) in Bavaria. Differences, though not uniform, are all less than 1° and mostly less than 0.2°C. For five provinces the difference between 1881–1940 and 1881–1930 is shown for each month. *Subject Headings:* **Atmospheric temperature, Bavaria, Germany.**—*M.R.*

8–59 551.524:551.521.1:523.74

Troeger, Heinz, **Sonnenflecken und Temperaturen der Luftmassen.** [Sunspots and temperatures of air masses.] *Meteorologische Rundschau*, 1(17–18):535–536, Nov–Dec. 1948. fig. **DWB**—*Subject Headings:* **Air mass temperatures, Sunspots.**

8–60 551.524.3:523.74

Troeger, Heinz, **Sonnenflecken und Wintertemperaturen.** [Sunspots and winter temperatures.] *Meteorologische Rundschau*, 3(5–6):133–134, May–June **1950.** fig., tables, 5 refs. **DWB, MH-BH**—By plotting departures of winter temperature at Berlin (200 years) against mean annual sunspot numbers, author finds that there are 3 groups of winters, in each of which temperature is negatively related to sunspots. Relation best shown in coldest winters. No significant relation before 1764 or in 1855–1910. *Subject Headings:* **Temperature variations, Sunspots, Berlin.**—*C.E.P.B.*

8–61 551.524.31:551.588.6

Raabe, Ernst-Wilhelm and Kohn, Hans-Lothar, **Über Temperaturverhältnisse von Kahlschlag und Wald.** [On temperature conditions in clearing and forest.] *Meteorologische Rundschau*, 3(1–2):13–15, Jan.–Feb. **1950.** 4 figs., table. **DWB**—Gives curves of diurnal variation 1 cm. above ground, at surface and 2 and 10 cm. depth on a hot summer day in bare open clearing, clearing with fine turf, under dense spruce forest, mossy beech wood and beech with grassy undergrowth. From 2–10 cm. depth, first two warmest in afternoon. *Subject Headings:* **Microclimatology, Forest influences.**—*C.E.P.B.*

8–62 551.524.32:63

Rosenkranz, F., **Die herbstliche Nachfruchtzeit.** [The late autumn harvest period.] *Wetter und Leben*, 1(12):360–363, March **1949.** fig. **MH-BH**—Discusses duration of interval between harvest and fall of temperature to 10°C. at different elevations in various parts of Austria. *Subject Headings:* **Temperature variations, Agricultural meteorology, Austria.**

8–63 551.524.37

Lauscher, Friedrich, **Wind und Wetter an sehr kalten Tagen. (Eine bioklimatisch-synoptische Skizze.)** [Wind and weather on very cold days. (A bioclimatic-synoptic sketch.)] *Wetter und Leben*, 2(5–6):97–102, Oct. **1949.** 4 tables. **DWB**—Gives frequency by pentads of days with mean temperature below −10°C. at Vienna 1873–1948. Occurrences are analyzed by 8 weather types, giving frequency, wind direction and speed, cloud, probability and amount of snow and cooling power (Hill formula). High pressure over Finland or Europe accounts for two-thirds of the days. Mean character of January is compared for various places in Europe and Asia. Results are discussed from point of view of building technique. *Subject Headings:* **Temperature extremes, Vienna.**—*C.E.P.B.*

8–64 551.524.37:632.1

Mäde, Alfred, **Zum Mietenklima.** [On the climate of root clumps.] *Meteorologische Rundschau*, 3(5–6):135–137, May–June **1950.** 2 figs. **DWB, MH-BH**—Curves show daily temperatures at Königsberg at 7h. in winter 1882–83: in air, at ridge of turnip clump, at base of clump on level ground and in troughs 25 and 50 cm. deep. Another diagram shows effect of covering with a layer of 50 cm. of earth and 10, 15 or 20 cm. of dung. Relations to 0°C. line show importance of subject. *Subject Headings:* **Microclimatology, Agricultural climatology, Crop storage.**—*C.E.P.B.*

8–65 551.524.37

Wood, C. A., **Colder than of late.** *Weather*, 5(3):99–103, March **1950.** 7 refs. **DWB, MH-BH**—Popular account of frosts, causes and protection. *Subject Headings:* **Frost, Frost protection.**

EARTH AND SEA TEMPERATURE

8–66 551.525

†*Albrecht, Fritz, **Untersuchungen über den Wärmehaushalt der Erdoberfläche in verschiedenen Klimagebieten.** [Investigations on heat economy of the earth's surface in different climatic regions.] *Germany, Reichsamt für Wetterdienst, wissenschaftliche Abhandlungen,*

Vol. 8, No. 2, Berlin, **1940.** 80+p. 39 figs., 17 tables, 70 refs. **DLC**—A classical treatise on the energy exchange of the continents and oceans, based on the detailed studies made at a number of places up to the beginning of World War II: Atlantic and Indian Oceans, Florida Straits, Soviet Arctic, Potsdam, Sodankylä (Finland), Irkutsk, the Gobi, Batavia and Eismitte (Greenland) by Wüst, Bönicke, Helland-Hansen, Sverdrup, Malmgren, Mosby, Defant, Ångström, Keränen, Haude, Albrecht, Boerema, Georgi, K. Wegener, Sprung, W. Schmidt, Wild, and Lunelund. Data on salinity and temperature (for oceans), and radiation, percentage of sunshine, vapor pressure, wind velocity, evaporation, rainfall, etc., for land and sea are given in elaborate tables and graphs for each climatic area where such data are available. Values of albedo over various surfaces by Ångström and Büttner are used as a basis for determining the outgoing radiation. In addition to the many systematically presented graphs and tables, there is an excellent bibliography and much carefully worked out theoretical development of the problems of land and sea radiation balance. *Subject Headings:* **Energy exchange, Albedo, Oceans, Continents.**—*M.R.*

8–67 551.526.6:551.464(262)

Darmois, M. and Mme Robert, **Observations de température et de salinité preparatoires à l'étude de la viscosité de l'eau de la Méditerranée au large de Monaco.** [Observations of temperature and salinity preparatory to the study of viscosity of the water of the Mediterranean off Monaco.] *Académie des Sciences, Paris, Comptes Rendus,* 225(22):1081–1082, Dec. 1, **1947. DWB**—Note. One page of data and remarks thereon. *Subject Headings:* **Sea temperatures, Salinity, Mediterranean Sea.**

8–68 551.526.6:82

Sutton, D. J., **Climatology at the Challenger Society.** *Weather,* 5(4):139–140, April **1950. MH-BH**—*Subject Headings:* **Sea temperatures, Climatic changes, Atlantic Ocean.**

8–69 551.526.6:551.501

Wahl, Eberhard, **Strahlungseinflüsse bei der Wassertemperaturmessung an Bord von Schiffen. (Ein Beitrag zur Fehlersystematik von Schiffsbeobachtungen.)** [Radiation effects in measurements of water temperature on board ships. (A contribution to the study of errors of ships' observations.)] *Annalen der Meteorologie,* 3(3–4):92–102, **1950.** 6 figs., 2 tables, 12 refs. Summaries in German and English p. 92. **DWB, MH-BH**—A ship disturbs the true temperature field. Errors were investigated by analyzing 46,000 Hollerith cards in 49–51°N. Diurnal range greatest (Aug. 0.6°C.) with clear skies; true range only 0.25°C. The various factors are discussed and a diagram shows distribution of errors. On a hot day an error of +0.6°C. is to be expected; error in monthly means may be 0.2°C. Author suggests that highest 5–7% of readings in each month should be omitted to get a better mean. *Subject Headings:* **Sea temperatures, Observational errors, Punch card analysis.**—*C.E.P.B.*

8–70 551.526.8

Fobes, C. B., **Extremes of ice-clearing dates calculated from new data of Maine and New Hampshire lakes.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 1(2):138–148, **1949.** 2 figs., 10 tables, 6 refs. Summaries in English, German and French p. 138–139. **MH-BH**—Tabulates long records for 10 lakes. Difference R between extremes for different periods represented by log R=k log P, where P is period in years; k for different lakes varies from 0.134 to 0.595. *Subject Headings:* **Lake temperatures, Maine, New Hampshire.**—*C.E.P.B.*

ATMOSPHERIC PRESSURE AND WIND

PRESSURE

8–71 551.54:551.51

Hollmann, Günther, **Zur Dynamik der Druck- und Drucktendenzfelder.** [On the dynamics of pressure and pressure-tendency fields.] *Annalen der Meteorologie,* 3(3–4):65–73, **1950.** 14 refs., 60 equations. Summaries in German and English p. 65. **DWB, MH-BH**—

Author first sets out the differential equations of horizontal and vertical air movements in a barotropic atmosphere in Cartesian and polar coordinates. He then considers the ground level pressure field, deduces the differential equations and interprets them in terms of vectors and vortices. Finally he extends the calculations to pressure changes and vertical motion in a baroclinic atmosphere. Highly mathematical. *Subject Headings:* **Dynamics of the atmosphere, Atmospheric pressure.**—*C.E.P.B.*

8–72 551.541:551.511

Faust, Heinrich, **Zur Frage der drucksteigernden Wirkung der Niederschlagsabkühlung.** [On the question of the effect of cooling by precipitation in raising pressure.] *Meteorologische Rundschau*, 3(5–6):122–123, May–June **1950.** 4 refs. **DWB, MH-BH**—Discusses argument between Sawyer and Loewe in Quarterly Journal of Royal Meteorological Society, 1946/7. Concludes that brief rise of pressure in a squall is due mainly to the weight of raindrops and the pressure of down currents. *Subject Headings:* **Squalls, Pressure variations.**—*C.E.P.B.*

8–73 551.543.2

Spar, Jerome, **On the theory of annual pressure variations.** *Journal of Meteorology*, 7(3): 167–180, June **1950.** 5 figs., 4 tables, 20 refs., 30 equations. **DWB, MH-BH**—By an extension of the methods used by Jeffreys and Bartels, a model of the semi-annual pressure variation over the entire earth is constructed by the author, and is tested against actual July–January pressures. The *perturbation method* is applied, ignoring the effect of surface friction; but by using spherical harmonics and considering the effect of the continents and oceans, (by integrating actual annual surface temperature amplitudes) the theory presented here agrees more closely with the empirical. Exceptions are due to lack of data over the Southern Hemisphere, and the retarding effect of mountain masses or other distorting effects of altitude. Actual charts of mean July–January temperature and pressure for the earth, are shown. *Subject Headings:* **Pressure variations, Spherical harmonics.**—*M.R.*

8–74 551.543.3:551.513.7

†Flohn, Hermann, **Stratosphärische Wellenvorgänge als Ursache der Witterungssingularitäten.** [Stratospheric wave processes as the cause of weather singularities.] *Experientia, Basel*, 3(8):319–322, **1947.** 29 refs. Summary in English p. 322. **DLC**—Discussion of singularities and symmetry points and their causal relationship. An important wave was found (with a period of 30.5 days) to be located above 20 km., one with a period of 15 or 18 days at the tropopause. Similar waves were found by Götz in ozone trend over the entire Northern Hemisphere. These periods are found to be divisors of the year, so that the singularities would be higher harmonic oscillations of the annual period. *Subject Headings:* **Singularities, Symmetry points.**—*From author's abstract.*

TURBULENCE

8–75 551.551:551.573

Davies, D. R., **Three-dimensional turbulence and evaporation in the lower atmosphere. I, II.** *Quarterly Journal oj Mechanics and Applied Mathematics*, 3(1):51–73, March **1950.** table, 80 equations. **DLC**—The investigation extends O. G. Sutton's theory of evaporation in a turbulent air stream from a plane saturated liquid surface to a finite rectangular lake, introducing lateral diffusivity. In Part I a mathematical solution is obtained which is applicable to any evaporating area. In Part II a power law of variation of diffusivity with height, incorporating the lateral effect, is determined by theory in the form $K_y = a_y U_1^{1-n} z^{\alpha}$ where α, n are determinable constants for a given turbulent state and a_y depends on α. This is applied to evaporation from a finite area and good agreement is obtained with observations, but a complete solution is not yet practicable. *Subject Headings:* **Turbulence, Evaporation.**—*C.E.P.B.*

8–76 551.551

Franke, M., **Bemerkungen über die Zeit-und Höhenabhängigkeit des Austauschkoeffizienten (Vorläufige Mitteilung).** [Remarks on the relation of the exchange coefficient to time

and height. (Advance communication.)] *Annalen der Meteorologie*, 3(3–4):118–119, 1950. **DWB, MH-BH**—Relation of *austausch* coefficient to height is not linear but follows probability integral on any one occasion. Variations are discussed. *Subject Headings:* **Energy exchange. Turbulence.**—*C.E.P.B.*

WIND

8–77 551.553.1

Marshall, W. A. L., **Sea breeze across London.** *Meteorological Magazine, London*, 79(936):165–168, June **1950.** 2 figs., 3 tables, ref. **DWB**—On July 1, 1949 in very hot spell wind in central London at 1605 G.M.T. changed from light N.E. to moderate E. with fall o temperature and considerable increase of humidity. By means of autographic records onse of sea breeze was traced to Abingdon 60 miles west of London; isochrones are given. *Subjec Headings:* **Land and sea breezes, London.**

8–78 551.553.12

Fleagle, Robert G., **A theory of air drainage.** *Journal of Meteorology*, 7(3):227–232 June **1950.** 4 figs., 15 refs., 26 equations. **DWB, MH-BH**—A theory of radiatively produced slope winds, first advanced by Jeffreys and developed by Prandtl and Defant, is investigated. The conclusion is that the maximum possible drainage velocity is directly proportional to the cotangent of the elevation angle (not the cosine as Prandtl deduced). *Subject Headings:* **Mountain and valley breezes, Air drainage, Slope winds.**—*M.R.*

8–79 551.555.3:551.515.12

*§Hoinkes, H., **Föhnentwicklung durch Höhentiefdruckgebiete.** [Föhn development in high-low pressure area.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A* 2(1):82–96, **1950.** 8 figs., 7 tables, 6 refs. Summaries in German, English and French p 82–83. **DWB, MH-BH**—A detailed synoptic-aerological analysis of an unusual föhn situation which occurred in the northern Alps (near Innsbruck and Sonnblick) on October 2–4, 1941. As high pressure lay to the northeast and low to the southwest on the surface charts, no föhn would have been expected, but the upper air charts showed warm, light air to the north and cold, dense air to the south of the Alps. Surface wind and temperature records and wind aloft for a number of stations are reproduced to illustrate the contention that the pressure difference was caused by cooling (due to cloud and precipitation) on the one hand and warming (due to sunshine and descent of the slopes) on the other. *Subject Headings:* **Föhn development. Synoptic-aerological studies.**—*M.R.*

8–80 551.555.3

Prohaska, F., **Neuere Anschauungen über die Meteorologie und Klimatologie des Föhns.** [Recent views on the meteorology and climatology of föhns.] *Experientia, Basel*, 3(6):232–237, **1947.** 3 figs., 9 refs. Summary in English p. 237. **DLC**—The latest theories regarding the origin, development and climatological significance of two kinds of föhn winds (cyclonic and anticyclonic or "free föhn") are discussed and schematically illustrated. Von Ficker's ideas are given precedence. Kuhn, W., **Bemerkungen zu K. Freys Föhntheorie.** [Remarks on K. Frey's föhn theory.] *Ibid.*, 3(10):423–424, **1947.** 3 refs. Summary in English p. 424. **DLC**—Criticism of a diagram by Frey in above article including theory and corrected diagram which shows solenoids more consistent with author's own theory and with observed wind above föhn inversion. *Subject Headings:* **Föhn winds, Alps.**—*M.R.*

8–81 551.558.2

Malsch, Wolfgang, Bartsch, Joachim, Killermann, Englbert, **Beobachtungen von stehenden Wellen (Föhn?) im Rheintal.** [Observations of standing waves (föhn?) in the Rhine Valley.] *Meteorologische Rundschau*, 3(5–6):134–135, May–June **1950.** 3 tables. **DWB MH-BH**—On May 2, 1949 waves were observed in st.-cu. at Karlsruhe. Pilot balloons showed alternating up and down currents. Explanation not clear. *Subject Headings:* **Föhn clouds. Rhine Valley.**—*C.E.P.B.*

AQUEOUS VAPOR AND HYDROMETEORS

CONDENSATION AND DEPOSITS

8–82 551.574.1:551.586

Leistner, Walter, **Das maritime Kernaerosol und seine Änderung landeinwärts.** [The maritime nuclear aerosol and its change inland.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* (1):68–73, **1949.** 3 figs., 10 refs. **MH-BH**—Average number of nuclei per cc. is: towns 50–100,000; health resorts of Mittelgebirge 8000; Wyk on Fohr 4000; summit of Mittelgebirge 1–3000, Zugspitze 400. This is a measure of the purity of the air. Nature of nuclei varies with origin. Condensation processes are summarized. Daily observations at Wyk with Schulz nuclei counter showed max. frequency (up to 7000 per cc.) with winds from NE and min. from WNW–SSW (sea winds, W. 3200). Max. frequency with strong winds (spray). Number of salt nuclei decreases by 20–30 per cent from sea edge to roof of house 100 meters inland. Only finest particles taken into body. *Subject Headings:* **Nuclei count, Bioclimatology.**—*C.E.P.B.*

8–83 551.574.1 551.577

*Woodcock, Alfred H., **Condensation nuclei and precipitation.** *Journal of Meteorology,* 7(2):161–162, April **1950.** 2 tables, 5 refs. **DWB, MH-BH**—The number of condensation nuclei in air over the Florida Coast is much greater than presupposed, as evidenced by samples taken recently at 12 m. above the sea and at cloud level. Some large hygroscopic particles as well as many minute sea-salt particles are present at all levels, giving reason to believe precipitation could occur from seeding by the former. *Subject Headings:* **Condensation nuclei, Precipitation, Florida.**

8–84 551.574.41:63

Lehmann, Paul and Schanderl, Hugo, **Tau und Reif; Pflanzenwetterkundliche Untersuchungen.** [Dew and frost, agricultural meteorological investigations.] *Reichsamt für Wetterdienst, Wissenschaftliche Abhandlungen,* Vol. 9, No. 4, Berlin, **1942.** 20+p. 8 figs., tables, 17 refs. **DLC**—A dissertation on the formation and evaporation of dew and frost, including a detailed discussion of instruments for measuring dew and moisture (lysimeters, dew recorders, etc.); and botanical considerations such as transpiration; use of dew by plants; the effect of artificial factors such as wind breaks (trees, hedges and fences, etc.), irrigation, fertilizer, root systems, various leaf surfaces, etc., on dew formation or evaporation; as well as the variations in meteorological elements such as radiation, temperature, humidity and wind. *Subject Headings:* **Dew, Frost, Lysimeters, Drosometers, Agricultural meteorology.**—*M.R.*

8–85 551.574.41:551.586:63

†Stephan, Johannes, **Zum Tauproblem.** [On the dew problem.] *Biologia Generalis, Wien,* 7(1–2):204–229, **1943.** table, 123 refs. (*Archiv für die allgemeinen Fragen der Lebensforschung.*) **DLC**—A comprehensive review of nearly all important research on the relation of dew to plant growth and disease made in every country during the past 100 years. Formation and measurement of dew, and the effect of dew on soil moisture are also treated. *Subject Headings:* **Dew, Bioclimatology, Agricultural meteorology.**—*M.R.*

8–86 551.575:551.551

Prügel, Heinrich, **Bemerkungen zu W. Regula: "Hochnebellage über dem Schwarzen Meer."** [Remarks on W. Regula: "High fog layer over the Black Sea."] *Meteorologische Rundschau,* 1(17–18):540–541, Nov.–Dec. **1948.** 3 refs. Rebuttal by W. Regula to the above remarks by Dr. Prügel, p. 541. **DWB**—*Subject Headings:* **Fog, Turbulence, Black Sea.**

8–87 551.575.3

Bonacina, L. C. W., **London fogs—then and now.** *Weather,* 5(3):91–93, March **1950.** **DWB, MH-BH**—Variations in intensity of fogs since 1800 briefly described. Improvements in recent years. *Subject Headings:* **Fog, London, England.**

CLOUDS

8–88 551.57

Diem, Max, **Messungen der Grösse von Wolkenelementen II.** [Measurements of th magnitude of cloud elements II.] *Meteorologische Rundschau*, 1(9–10):261–273, March–April **1948.** 6 figs., 5½ p. graphs, 9 tables, 19 refs. **DLC**—*Subject Heading:* **Cloud physics.**

8–89 551.576.

Prügel, Heinrich, **Wolkenstrassen.** [Cloud lanes.] *Meteorologische Rundschau*, 3(5–6):131–133, May–June **1950.** 7 refs. **DWB, MH-BH**—The different types of lines of cumulc form clouds are defined and their conditions of occurrence set out. "Flat" cloud series always limited above by an inversion, are sub-divided into cloud series, cloud chains, clou bands and cloud rolls or waves. "Cloud streets" are vertically thick. Cloud series may b "topographical" due to the contours of the ground, and "free," due to dynamic processe independent of the ground. Open lanes in an otherwise overcast sky are termed "negativ cloud streets"; they are often formed by air descending over a cold river in warmer surround ings. *Subject Heading:* **Cloud lanes.**—*C.E.P.B.*

8–90 551.576.1:551.510.

†Schneider-Carius, Karl, **Die Bedeutung des Schichtenbaues der Troposphäre für di Aufstellung von Wolkensystemen.** [The significance of stratification of the troposphere fo the formation of cloud systems.] *Archiv für Meteorologie, Geophysik und Bioklimatologie Ser. A*, 2(1):97–118, **1950.** table, 34 refs. Summary in German, English and French p. 97–98. **DWB, MH-BH**—The author considers that Stüve's scheme for classification of clou systems is antiquated, and that those of Schinze-Siegel and Schwerdtfeger and Wehrlé ar some improvement. He presents seven types of cloud formations, based on their relation t the "Ground-layer" or lapse rate in the first 3,000 ft. or so above the surface. These types are (A) Inversion, (B) High fog, (C) Normal, (D) Convection, (E) Squally, (F) Release (F Thunderstorm, F_2 Rainy weather). This classification is applied to the International Clou Atlas both for high latitude and tropical cloud systems, and advantages in reporting an analysis for forecasting are cited. *Subject Headings:* **Cloud classification, Structure of tropo sphere.**—*M.R.*

8–91 551.576.1

Prandtl, L., **Über Mammatuswolken.** [On mammatus clouds.] *Annalen der Meteor ologie*, 3(3–4):119–120, **1950.** 2 figs., 3 photos. **DWB, MH-BH**—Air movements in th cloud layer during development of mammatus cloud are analyzed and illustrated diagram matically. *Subject Headings:* **Cloud formation, Mammatus clouds.**—*C.E.P.B.*

8–92 551.576.11

Great Britain. Meteorological Office, **Cloud atlas for aviators,** 3rd ed. London, H. M Stationery Office, **1943.** 19 p. 4 figs., 20 photos. At head of title: M.O. 450 (A.P. 1875) (Reprinted 1950 incorporating Amendment lists 1–3). **MH-BH**—Introduction describe types of clouds and operational value. Each type of cloud is described and illustrated; con densation trails are included. Diagrams show relation of cloud types to depressions. *Subjec Headings:* **Cloud classification, Aeronautical meteorology, Manuals.**

8–93 551.576.12(02

Haynes, B. C., **A new International Cloud Atlas.** *American Meteorological Society, Bulletin* 31(3):99–102, March **1950. DWB, MH-BH**—Work of the Cloud Committee of the I. M. O in defining cloud genera and furnishing new photographic material for a revised Internationa Cloud Atlas, is described. The project is under the direction of Dr. A. Viaut, Director of th Meteorological Service in France. *Subject Headings:* **Cloud atlases, Handbooks.**—*M.R.*

RAINFALL

8–94 551.577.11:551.576:551.509.6

Vierhout, R. R., **On the formation of rain in clouds not reaching up to the freezing level** *Journal of Meteorology*, 7(3):223–226, June **1950.** 3 refs., 8 equations. **DWB, MH-BH**— Computations made by the author indicate that Langmuir's chain reaction theory for precipita

tion formation in clouds seeded over Hawaii, is not sufficient. An alternate explanation that falling dry ice pellets produce *evaporation* and resulting disturbances leading to coalescence, is presented and suggested as mechanism whereby rain forms in the subtropics at levels below the zero isotherm. *Subject Headings:* **Cloud physics, Cloud seeding, Langmuir's theory.**—*M.R.*

8–95 551.577.2(43):551.577.32

Ringleb, Franz, **Zur Einteilung West-und Nordwestdeutschlands in Niederschlagsgebiete.** [On the division of west and north-west Germany into rainfall provinces.] *Meteorologische Rundschau*, 3(5–6):123–126, May–June **1950.** 2 figs., 2 tables, 12 refs. **DWB, MH-BH**—A fine scale classification into rainfall types (fig. 1) is based on annual variation, indicated by initial letters of months of maximums in order of magnitude, and chief minimum by a figure, e.g. D a o_4=maximums in Dec., Aug., Oct., chief minimum April. Other methods are mentioned but in all cases maps require generalization. Partition into rainfall provinces is based on the combination of these types with rainfall amounts in the year, summer, and growing season. *Subject Headings:* **Rainfall distribution, Rainfall variations, Germany.**—*C.E.P.B.*

8–96 551.577.3

*Coutts, J. R. H., (Univ. of Natal), **Meteorological observations at Pietermaritzburg, Natal; rainfall intensity and atmometry.** *Royal Society of South Africa, Transactions*, 32(3):315–319, April **1950.** 2 tables, 10 refs. **DLC**—Rainfall records made at the University since 1938 show an extreme variability from season to season, (19.84″ in 1941 to 46.37″ in 1942). 90% occurs from Sept. to April and 10% in winter (May–Aug.) Intensity data analyzed by months for each year, show that 60% of precipitation falls at rate of over .1 in./hr. and from 20–40% at rate of >1 in./hr.; the most intense occurring from Dec.–March. Atmometer data shows that at least 70% of evaporation loss is due to temperature and humidity factors. Wind is most important other factor. Correlation coefficients shown in table. *Subject Headings:* **Rainfall variations, Atmometry, Natal.**—*M.R.*

8–97 551.577.32(262)

Huttary, Josef, **Die Verteilung der Niederschläge auf die Jahreszeiten im Mittelmeergebiet.** [The seasonal distribution of rainfall in the Mediterranean.] *Meteorologische Rundschau*, 3(5–6):111–119, May–June **1950.** 7 figs., table, 20 refs. **DWB, MH-BH**—Seasonal charts of percentage distribution of precipitation are shown for whole Mediterranean region. Causes are discussed in terms of temperature, winds, cyclone tracks and land and sea distribution. The area is classified into 8 types according to seasonal distribution. The seasonal character of each year from 1853–1940 is shown diagrammatically for 9 stations, and the monthly distribution in each year 1881–1930 at Gibraltar, Marseilles, Milan and Bucharest. *Subject Headings:* **Precipitation distribution, Mediterranean Region.**—*C.E.P.B.*

8–98 551.577.36

Berkaloff, E. et al., **Frequence des pluies en Tunisie.** [Frequency of rain in Tunis.] Service Météorologique, Tunis, [Jan. 18, **1949.**] Fascicule 1, 39 leaves, 1901–1952; Fascicule 2, 39 leaves, 1926–1945; Fascicule 3, 39 leaves, 1901–1945; Fascicule 4, 43 leaves, (Précipitations mensuelles et annuelles) 1901–1945. tables, 3 refs. **DLC**—Beginning in 1925, M. Charles Bois compiled data for rainfall stations in Tunis, and in 1938, 1939 and 1940 published three works on frequency of torrential (over 30 mm. in 24 hrs.) rains in Tunis. The work was continued by his successors to include non-torrential rain; the result being a series of statistical publications of which these are the first four. Frequencies of rains (a) within certain class limits and (b) exceeding certain values (trace, 5, 10, 20, 30, 50, and 100 mm. per day), expressed in days per month are presented for 1901–1925, 1925–1945 and 1901–1945 respectively in the first three volumes, for the 40 principle stations in Tunis. The fourth volume gives the frequencies (in actual and in percentage values exceeding the limits given above, as well as 200, 300, 400 and 600 mm./month) for monthly and annual (classes 0 up to 2,000 mm.) rainfall at the same stations for 45 years when available (in some cases as few as 40 or even 36 years of record are used). *Subject Headings:* **Rainfall frequency, Tunis.**—*M.R.*

8–99 551.577.37(497.1)

*§Reya, Oskar, **Maksimalne intezitete padavin v Slovenskem Primorju.** [Maximum intensity of precipitation in the Slovenian littoral.] *Geografski Vestnik, Ljubljana*, Vol. 20–21, p. 87–110, **1948–1949.** 8 figs., 2 tables, 5 refs. Summaries in Russian and French. **DLC**—Maximum 24 hour, 1 hour and 1 minute rainfalls are calculated for 42 places (1923–1936). Charts show the areal distribution of intense rainfall for eight of these occasions in the region to the north and east of Trieste. Heaviest rains come with cold fronts, not thundershowers. *Subject Headings:* **Rainfall intensity, Yugoslavia.**—*M.R.*

8–100 551.577.38

Polli, Silvio, **Considerazioni sul recente periodo di scarse precipitazioni meteoriche.** [Comments on the recent period of scanty (meteorological) precipitation.] *Rivista di Ecologia*, 1(1–2):81–86, **1949.** tables, 7 refs. Summaries in Italian, English and German p. 4–5. (Reprint available: Trieste, *Istituto Talassografice, Pubbl.* No. 25, 1949.) **DWB**—The period 1941–1947 was the longest period in a century (1841–1948) of record, with subnormal precipitation (1920–1925 was the second longest) in and around Trieste. *Subject Headings:* **Drought, Rainfall variations, Trieste, Italy.**—*M.R.*

8–101 551.577.51

Hauer, Hans, **Ein schauerauslösender Sogeffekt auf der Zugspitze.** [A shower-liberating suction effect on the Zugspitze.] *Meteorologische Rundschau*, 2(11–12):326–327, Nov.–Dec., **1949.** 2 figs., 3 refs. **DWB**—With a S or SE wind a lee eddy forms on north side which combines with up-slope wind to form an upward current producing cloud and light showers in otherwise fine weather. *Subject Headings:* **Rain formation, Orographic effects, Bavaria, Germany.**—*C.E.P.B.*

8–102 551.577.51

Steinhauser, F., **Über die Struktur des Jahresganges der Niederschläge am Zentralalpenkamm.** [On the structure of the annual variation of rainfall on the Central Alpine ridge.] *Wetter und Leben*, 2(1–2):1–4, May **1949.** table. **MH-BH**—Rain gage on south side of Sonnblick shows too little precipitation with southerly winds, that on north with northerly winds. Normal value taken as mean of the two. To correct long series on north side to this normal, monthly factors were worked out which show marked annual variation due to annual change of winds. Finally corrected to true value by comparison with records of a totalizer. *Subject Headings:* **Rainfall distribution, Orographic effects, Central Alps.**—*C.E.P.B.*

8–103 551.577.61

Petrovič, Štefan, **Provodeň na východnom Slovensku dňa 15. Augusta 1949.** [Inundation in eastern Slovakia on 15 August 1949.] *Meteorologické Zprávy*, 3(4–5):81, Feb. **1950.** 4 photos. **MH-BH**—Synoptic conditions for the period of August 11–17, 1949 are described (cold air mass to west, warm to the southeast). An intense storm on Aug. 15, produced the flood which did great damage to railroads and buildings as shown by four photographs. *Subject Headings:* **Hydrometeorology, Floods, Czechoslovakia.**—*M.R.*

HYDROMETEOROLOGY

8–104 551.579(02)

†Velikanov, Mikhail A., **Gidrologiia sushi.** 4th ed. [Land hydrology.] Leningrad, Gidromet. Izdat., **1948.** 530 p. 176 figs., 37 tables, 66 refs., 126 equations. **DLC**—This fourth edition of a standard textbook for advanced hydrometeorological and engineering students, contains the usual chapters on precipitation, evaporation, ground water, river systems, lakes and bays, hydrologic cycle, surface runoff, river runoff and transport (of sediment) which were presented in the first three editions. Each chapter, however, has been revised and enlarged and additional major chapters on statistical methods in hydrology, and on channel processes, as well as supplementary material on erosion, snow melt and snow surveying, ice cover, the influence of vegetation on runoff, etc., have been added. Considerable material on hydrodynamics as applied to fluid motion and water balance, and the climatological

and geographical aspects of runoff, etc., show the balance maintained between the theoretical and practical side of hydrology. The emphasis, however, is on scientific hydrology rather than on hydrologic forecasting. The two page classified list of references is confined entirely to Russian language sources, but in the section on the history of hydrology, the author goes back several centuries in tracing the development of hydrology by the Russians and makes the contribution of the Soviets in the past 30 years appear enormous in contrast to the feeble efforts of hydrologists in other countries, although these latter contributions are incorporated in the material presented in this course of study and are carefully accredited to the proper author. *Subject Headings:* **Hydrology, Textbooks, History.**—*M.R.*

8–105 551.579.1(436)

Steinhäusser, Hans, **Zur Wasserhaushaltsbilanz in den österreichischen Südalpen.** [On the water-economy balance in the Austrian southern Alps.] *Wetter und Leben*, 2(5–6):102–107, Oct. **1949.** 2 tables. **DWB**—Gives for various Austrian rivers: catchment area, mean rainfall, runoff, evaporation and runoff factor. For the upper Rhine the latter is 0.83. Some very high (published) runoff factors (up to 1.05!) are attributed partly to carry-over by ice and snow, but especially to underestimates of rainfall in mountain regions. Rainfall measurements at stations above 1500 m. should be corrected for exposure to wind. There are too few stations at high levels. *Subject Headings:* **Hydrologic cycle, Alps, Austria.**—*C.E.P.B.*

8–106 551.579.2(02)

Forschungsanstalt für Gewässerkunde, **Richtlinien für grundwasserkundliche Beobachtungen und ihre Auswertung.** [Instructions on scientific ground-water observations and their evaluation.] Stuttgart, Franckh'sche Verlagshandlung, [1949]. 40 p. 26 figs., 7 refs., 9 append. **DWB**—*Subject Headings:* **Hydrology, Ground water, Manuals.**

8–107 551.579:631.4

Whelan, Donald E., **A method of evaluating the hydrologic effects of land use on large watersheds.** *American Geophysical Union, Transactions*, 31, part 1, (2):253–261, April **1950.** 12 figs., 14 refs. **DWB, MH-BH**—Separate hydrographs showing the relative contributions of surface, subsurface and ground water components to the flood hydrographs of the September 1938 and June 1942 floods in the Baker River (Merrimack watershed), New Hampshire, are compiled. Methods described and nomograms presented. Application to land use and management stressed. *Subject Headings:* **Soil conservation, Flood control, New Hampshire.**—*M.R.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

8–108 551.58(02)

†§Kendrew, Wilfred G., **Climatology; treated mainly in relation to distribution in time and place.** Oxford, Clarendon Press, **1949.** 383 p. 125 figs. (including synoptic charts), 16 plates, numerous tables, biblio. p. 375–376. **DLC**—"Kendrew," or more specifically "climate," by Kendrew, has for 20 years been a standard and often quoted tool for students and writers in many parts of the world. This third edition has been revised and improved by the addition of supplementary material on the upper air, air masses, fronts and synoptic aspects of climatology. The outline is very simple, there being six parts: I, Insolation and Temperature, II, Pressure and Winds, III, Vapor, Rain, Cloud, Sunshine and Visibility, IV, Mountain and Plateau Climate, V, Weather of the Westerlies, and VI, Some Climatic Types. There is no space devoted to any artificial classification of climates; the general treatment being from the physical or synoptic approach. On the other hand, the work is not laborious to read or understand, as the dynamic and statistical aspects (as in the works by Haurwitz and Conrad) are not emphasized. The work deals mainly with surface climatology as an integration of day to day and year to year occurrence of the several meteorological elements. *Subject Headings:* **Climatology, Textbooks.**—*M.R.*

8–109 551.582(02)(485)

†*Ångström, Anders K., **Sveriges klimat.** [The climate of Sweden.] Stockholm, General stabens Litografiska Anstalt, **1946.** 105 p. 42 figs., 6 colored plates in fold, 10 tables, 4 refs. **DLC**—This book comprises a description and analytical treatment of the factors which influence the climate of Sweden, and the usual climatic elements (temperature, rainfall, wind, cloudiness, frost, etc.). The approach is on a rational basis; the climate being a result of radiative balance as manifest in changing atmospheric circulation patterns modified by maritime and continental factors and local topography (synoptic climatology). Unusual interest lies in the emphasis on snow cover, earth temperatures, long term climatic variations, upper air climatology and radiation climate—the author being an authority on the latter subject. The whole is given a practical slant by frequent mention of applications to vegetation, agriculture, forestry and commerce. A great deal of average and extreme climatic data are presented in elaborate tables, graphs and color charts; the latter showing evidence of great variety and ingenuity. *Subject Headings:* **Climatology, Textbooks, Sweden.**—*M.R.*

8–110 551.582(675)

†*Bernard, Étienne, **Le climat écologique de la Cuvette centrale congolaise.** [The ecological climate of the central Congo Basin.] Brussels, *Publications de l'Institut National pour l'Etude Agronomique du Congo Belge* (*I.N.E.A.C.*), **1945.** 240 p. 36 figs., (2 color charts at end of issue), 70 tables, 176 refs. **DWB**—An analytical and scholarly work on the climate of the northern part of the Belgian Congo, in which the author presents a vast amount of well-organized data (considering the short time the region has been developed); including original charts, maps and diagrams illustrating the courses and distribution of the various climatic elements. First the effects of geographic factors, relief, topography and vegetation are discussed. Then the meteorological network and the history of the important stations. The problem of radiation is treated in all its aspects; theoretical and applied: global radiation, sunshine, cloudiness, photoperiodism and secular variability. Then the temperature regime, soil temperature, winds, storms, water vapor, precipitation, drought, evaporation and climatic classification (Köppen and Martonne) are treated in separate chapters. There is an excellent bibliography and the work is well-indexed. Most of the space is taken up with an analysis of the physical factors of climate as they affect vegetation (precipitation effectiveness and other indices). A great deal of space is devoted to aspects of circulation and other *synoptic* considerations. Going back even farther to find the causes of the circulation, the author discusses the effect of extraterrestrial influences, ozone layer, UV radiation, impurities and water vapor in the atmosphere on globial radiation as measured at Bambesa (1934–1939) and Yangambi (1939). An appendix consists of a tabulated comparison of six kinds of actinometers and photometers, with a discussion of the usefulness of such meters in agricultural and ecological practice. Although this work came out in 1945, nothing to equal it has appeared in any country since. *Subject Headings:* **Climatology, Ecology, Congo Basin.**—*M.R.*

8–111 551.582(676)

§Fenton, L., **Climate of the Lake Victoria plateau.** Nedlands, *University of Western Australia, Geographical Laboratory* (*Economic Dept.*), *Research Report*, No. 6, June **1949.** 15 mimeo. p. 4 charts, 2 tables. **DWB**—Brief descriptive material on the climate and geography of this portion of East Africa, including tables of monthly temperature, rainfall and precipitation effectiveness ratio for 46 stations. Maps show Thornthwaite's and Köppen's climatic types and number of dry and number of wet months for Uganda, western Kenya and northern Tanganyika. *Subject Headings:* **Climatology, Precipitation effectiveness, East Africa.**—*M.R.*

8–112 551.582(691)

*Goldflam, L. and Jones, H. A., **The climates of Madagascar.** Nedlands, *University of Western Australia, Geographical Laboratory*, (*Economic Dept.*), *Research Report*, No. 7, July **1949.** 17 mimeographed pages. tables, 3 charts, 14 refs. **DWB**—Brief summary of climate and geography followed by statistical tables for 37 stations, giving monthly temperature, precipitation and precipitation effectiveness (Thornthwaite's formula). Original charts (1:3⅓ million), show precipitation effectiveness, duration of the wet and duration of the dry

season for Madagascar. *Subject Headings:* **Climatology, Precipitation effectiveness, Madagascar.**—*M.R.*

8–113 551.582:63:551.577(94)

*Hounam, C. E., **Climate of the south west wheat belt of N.S.W. with special reference to rainfall over marginal areas.** Studies in applied climatology, New South Wales—Pamphlet No. 2, 1947. Australia, Meteorological Branch. 22 p. 22 maps, 9 tables, 5 refs. **DWB**—Discussion of physiography, temperature and rainfall with special emphasis on effective rainfall in the arid regions of New South Wales. Data on temperature means and extremes, rainfall averages, extremes and probabilities, and charts of frost and rainfall probability are included. Charts for each month of the growing season, presenting data on "seasonal growth factor" and "effective rainfall" are especially interesting. *Subject Headings:* **Agricultural climatology, Rainfall probabilities, New South Wales, Australia.**—*M.R.*

8–114 551.582(678.2)

Kohl-Larsen, Ludwig, **Das Klima des Njarasa-Grabens.** [The climate of Njarasa-Graben.] (In his **Auf den Spuren des Vormenschen; Forschungen, Fahrten und Erlebnisse in Deutsch-Ostafrika.** [Deutsche Afrika-Expedition 1934–1936 und 1937–1939] Stuttgart, Strecker und Schröder, 1943. Vol. 2:245–249.) **DLC**—Observations of temperature, wind and weather were taken three times a day at Matete, (Tanganyika, East Africa) during Sept., Oct., and Nov. 1934, Oct. 1935 to Jan. 1936, and from Jan. to Sept. 1938. A brief summary is given for each month during the three expeditions. *Subject Headings:* **Climatology, Tanganyika, East Africa.**—*M.R.*

8–115 551.582(438)

§†Kosiba, Aleksander, **Klimat ziem Śląskich.** [The climate of Silesia.] Katowitz, Wydawnictwa Institutu Śląskiego, **1948.** 124 p. 18 figs., 35 tables, 75 refs. (Zagadnienia Gospodarze Śląska, Ser. 2, No. 9.) **DWB**—An analytical and descriptive study of the climate of Polish Silesia for the use of Poles recently moved to the newly acquired territory of Silesia, to provide them with information as an aid in their economic and agricultural activities. The approach is through synoptic rather than classical climatology—followed by discussion of the means and frequencies of the ordinary climatic elements, plus data and discussion of radiation, albedo, soil and snow temperatures, evaporation, wind frequencies, snow cover and aperiodic changes in temperature and precipitation. Titles of the figures and tables are given in both Polish and English. *Subject Headings:* **Climatology, Silesia, Poland.**—*M.R.*

8–116 551.582(497.1)

†Manohin, Vitalij, **Podnebje Ljubljane.** [The climate of Ljubljana.] *Geografski Vestnik, Ljubljana,* 17(1–4):3–48, **1945.** tables, 46 refs. In Serbian, English summary p. 46–48. **DSI**—The author has made a review of the existing literature on the climate of Slovenia (Serbia) and a careful analysis of 86 years of meteorological data for Ljubljana (1851–1936). Not only rainfall and temperature, but cloudiness, wind direction and speed (frequencies), absolute humidity (greatest observed vapor pressure 12.4 mm.—1851–1936), synoptic types (based on direction of air flow), fog, snow, thunderstorms, hail, etc., are treated analytically. Special emphasis is placed on long period changes, local variations, and on singularities. Daily mean temperatures are calculated for the 86 years and shown graphically along with curves for Paris (1757–1886) Breslau (1791–1890) and Vienna (1775–1874). *Subject Headings:* **Climatology, Ljubljana, Yugoslavia.**—*M.R.*

8–117 551.582(497.1)

Manohin, Vitalij, **O podnebju Ljubljane v dobi 1933–1947.** [The climate of Ljubljana in the period 1933–1947.] *Geografski Vestnik, Ljubljana,* Vol. 20–21, **1948–1949.** 3 tables. In Serbian, French summary. **DSI**—A study of temperature and rainfall data for the period 1933–1947, compared with the long period 1851–1948, shows that the last 15 years have been characterized by great fluctuations or anomalies in both temperature and rainfall. Winter temperature anomalies were especially remarkable: with 48 freezing days in a row and an extreme minimum of −26.5°C. in 1942, (January 1942 5.5°C. below normal). Jan. 1948 was

7.1°C. above normal; June 28, 1935 hottest in 100 years (38°C.) followed closely by Aug. 1943 (34.5°C.) and Sept. 1942 (32.5°C.) Long droughts during period were bad for agriculture and hydroelectric interests. Driest year was 1946. *Subject Headings:* **Climatology, Ljubljana, Yugoslavia.**—*M.R.*

CLIMATIC VARIATIONS

8–118 551.583

†Schwarzbach, Martin, **Das Klima der Vorzeit. Eine Einführung in die Paläoklimatologie.** [The climate of the past. An introduction to paleoclimatology.] **1950.** 211 p. 70 figs., tables, 850+ refs., (mostly without titles).—An excellent summary of the present knowledge of paleoclimatology. Chap. I sets out historical development of the subject (photos of palaeoclimatologists). Chap. II describes the factors affecting present climate. In Chap. III the various lines of evidence (zoological, botanical, lithological) for past climates are described in detail—for warmer and cooler, drier and rainier climates, traces of wind direction and speed, thunder, seasonal and long-period climatic variations, and quantitative methods of calculating geological temperatures. Chap. IV deals briefly with geological time. Chap. V sets out the known facts about the climates of the successive geological epochs. In Chap. VI the numerous hypotheses of climatic change are classified and critically discussed; the author's conclusions (p. 190) are that climate depended to a large extent on the changing configuration of the earth, glaciations following uplift (after long intervals), but this factor is not by itself sufficient to explain all the facts. The "radiation curve" (elements of the earth's orbit) appears unable to account for repeated glaciation and the ultimate cause is presumably variations of solar radiation. Pole movements and continental drift have played no part in the later stages of the earth's history but seem necessary to account for the Permo-Carboniferous glaciation. The "solar-topographic" hypothesis of R. F. Flint (1947) is favored. The warm periods which made up most of geological time are attributed to terrestrial causes. The last chapter discusses very briefly the possibility of future climatic changes. There is an excellent index. *Subject Headings:* **Climatic changes, Paleoclimates.**—*C.E.P.B.*

8–119 551.583.13

*Omshansk'ii, M. O., **Pro ritmichni vidmini klimatu ta ikh mozhlivi prichini.** [On rhythmic changes in climate and their possible causes.] Kiev, *Akademiia Nauk, USRR, Zhurnal Geologo-geografichnogo Tsiklu*, (Journal du Cycle de Geologie et de Geographie), No. 1(5):97–116, **1933.** graph, tables, ref., equation. Original in Ukranian, summary in German p. 115–116. **DLC**—On the basis of elaborate statistical investigation of the observations of severe and mild winters in western Europe, periodicity in the Nile floods, early and late wine harvests in France, early and late ice movements in the Dwina, and the extreme hot and dry, or cold and wet summers, the author finds a 11.5 year rhythm corresponding to a periodicity in solar activity. *Subject Headings:* **Climatic changes, Periodicities, Nile flood.**—*M.R.*

8–120 551.583.15

Kreutz, Wilhelm, **Der lange, kalte Winter 1946/47 und sein Einfluss auf das Bodenklima.** [The long, cold winter of 1946–1947 and its influence on the surface climate.] *Meteorologische Rundschau*, 1(7–8):204–208, Jan.–Feb. **1948.** 3 figs. **DLC**—*Subject Heading:* **Abnormal winters.**

8–121 551.583.3

Johnson, Martin, **Sun, earth and Ice Age. Methods for criticising suggested causes of the Quaternary cold periods.** *Science Progress*, 37(148):625–643, Oct. **1949.** 4 figs., 18 refs. **DLC**—Causes are classified as: A, known to have been present; B, conceivable but no evidence for or against; C, unlikely because of independent contrary evidence. Discussion includes: changes of earth's axis and orbit (A); pole migration (C); geographical and geological causes (A); solar changes (C); abnormal atmospheric absorbents (B or C). *Subject Headings:* **Climatic changes, Quaternary climates.**—*C.E.P.B.*

8–122 551.583.3(26)

Wiseman, J. D. H. and Ovey, C. D., **Recent investigations on the deep-sea floor.** *Geologists' Association, London, Proceedings*, 61(1):28–84, **1950.** 3 figs., 3 plates, 2 tables, numerous

refs. **DLC**—After describing the history of deep-sea sounding, the morphology of the ocean floor and methods of obtaining cores and dating by radium content, authors consider the variations of sea surface temperature shown by species of foraminifera and glacial material in cores. Four cold layers at first considered to represent the four main glacial periods are now thought to cover only 62,000 years and to represent four stages of the Wisconsin. The various theories of climatic change are discussed but the amount of deep-sea material is not yet sufficient to distinguish between them. A reconstruction of the ice-limits, storm tracks and distribution of erratics in the North Atlantic during the maximum glaciation is given. *Subject Headings:* **Climatic changes, Glacial periods, Ocean floors.**—*C.E.P.B.*

8–123 551.583.3

Wundt, Walter, **Neue Erörterungen zu den Ursachen der Eiszeit.** [New discussions on the causes of the Ice Age.] *Meteorologische Rundschau,* 3(5–6):119–122, May–June **1950.** 14 refs. **DWB, MH-BH**—Remarks on a symposium at Cologne in 1949. On question: are mild winters necessarily rich in snow, author thinks that snow was heavy only in early part of ice age; with the general fall of temperature, nourishment of glaciers ceased. Berg's correlations between temperature and precipitation are positive in maritime regions, negative in interior of continents. Note also discusses Behrmann's views on the role of the Gulf Stream in initiating the Ice Age, the effects of relief, and the radiation curve. *Subject Headings:* **Climatic changes, Quaternary climates.**—*C.E.P.B.*

MICROCLIMATOLOGY

8–124 551.584:551.511(02)

†Laikhtman, D. L. and Chudnovskii, A. F., **Fizika prizemnogo sloia atmosfery.** [Physics of the layer of air near the ground.] Leningrad, Gosudarstvennoe Izdatel'stvo Tekhniko-Teoreticheskoi Literatury, **1949.** 254 p. 50 figs., 19 tables, 72 refs., 333 equations, append. **DLC**—A major theoretical and practical treatise on micrometeorology, based mainly on recent investigations of Soviet meteorologists and agrophysicists. A great deal of attention is payed to the physical characteristics of the surface, especially the soil (radiation, conduction, reflection, infiltration and evaporation). The dynamics and thermodynamics of the microclimatic layer are treated in detail, with ample discussion of turbulent exchange and dissipation of energy with respect to stability. The last three chapters consider *wind structure* and turbulent viscosity, *temperature regime* (vertical, diurnal and transformation of air masses), and *water vapor* (evaporation, condensation, gradients and transport), and the instruments and observation of each respectively. The list of references, given by chapters, contains a few non-Russian items, and many references to the best Soviet works through 1948. *Subject Headings:* **Micrometeorology, Turbulent exchange, Textbooks.**—*M.R.*

8–125 551.584.2(43):551.586

Dammann, Walter, **Klimatologie der Nordseeküste unter dem Gesichtspunkt der Berücksichtigung verschiedener Witterungsabschnitte.** [Climatology of North Sea Coast from the view-point of various spells of weather.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* (1):13–18, **1949.** 8 figs. **MH-BH**—The important feature for bioclimatology is the development of spells of weather (Witterung) in small-scale climate. Effect of coast, interior and mountains in westerly and anticyclonic types shown by sections and charts of wind force, rainfall, sunshine and fog. These lead to division of N.W. Germany into 5 climatic types: coastal, hinterland, interior, valley climate of foothills and climate of Harz. The first and the last two have specific bioclimatic peculiarities. *Subject Headings:* **Bioclimatology, Topographic effects, North Sea Coast, Germany.**—*C.E.P.B.*

8–126 551.585.5(43)

Ringleb, Franz, **Die hygrische Kontinentalität im Klima West- und Nordwestdeutschlands.** [On continentality (with respect to moisture) of the climate of west and northwest Germany.] *Meteorologische Rundschau,* 1(9–10):276–282, March–April **1948.** 5 figs., 3 tables, 42 refs. **DLC**—*Subject Headings:* **Continental climates, Germany.**

BIOCLIMATOLOGY

8–127 551.586:615.8

Aschenbrenner, Reinhard, **Seeklima und Herzkrankheiten.** [Sea climate and heart diseases.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* (1):38–41, **1949. MH-BH**—Heart disease is now frequent in Germany. Rest and quiet in beautiful surroundings are beneficial but sea bathing strains weak hearts. The changeable windy climate of the North Sea coast is unsuitable for types sensitive to weather but is essential for types needing relaxation and training of circulation. *Subject Headings:* **Climatotherapy, North Sea Coast.**—*C.E.P.B.*

8–128 551.586:615.8

Döhring, F., **Seeklima und Hautkrankheiten.** [Sea climate and skin diseases.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* (1):5–6, **1949. MH-BH**—Sea bathing cures many but not all skin diseases. Details given of those diseases benefited by North Sea climate but individual patients have idiosyncracies. *Subject Headings:* **Climatotherapy, North Sea Coast.**—*C.E.P.B.*

8–129 551.586:615.8

Haeberlin, Carl, **Praktische Erfahrungen an den Seeküsten.** [Practical experiences on the sea coast.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* (1):73–79, **1949.** 18 refs. **MH-BH**—Catarrh of upper air passages is improved by the purity and high humidity of sea air; clinical details given. Incidence of common colds is lessened. Effect on other ailments and peculiarities of the different seasons are discussed. Sea climate and sea bathing are the best combination of healing forces. *Subject Heading:* **Climatotherapy.**—*C.E.P.B.*

8–130 551.586:615.8

Kestner, Otto, **Die Einwirkung des Seeklimas auf den Menschen.** [The influence of sea climate on man.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* (1):3–5, **1949. MH-BH**—Author investigated metabolism under influence of sea baths at Margate and Poole, England, open respectively to N–N.E. and S. Little difference, albumen increased by 5 gm./day showing body rebuilding. Size and weight of children increased, probably owing to greater appetite. *Subject Headings:* **Climatotherapy, England.**—*C.E.P.B.*

8–131 551.586:615.8

Krauel, G., **Der Einfluss des Nordseeklimas auf das vegetative Nervensystem.** [Influence of the North Sea climate on the vegetative nervous system.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* (1):66–68, **1949. MH-BH**—The vegetative system is the receiver and conductor of climatic stimuli through the skin. The physiological processes are discussed. *Subject Headings:* **Climatotherapy, North Sea Coast, Germany.**—*C.E.P.B.*

8–132 551.586:615.8

Naegeli, Th., **Zur Therapie der extrapulmonalen Tuberkulose in der Ebene, im Gebirge und an der See.** [On the therapy of extrapulmonary tuberculosis on the plains, in the mountains and at the sea.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* (1):42–50, **1949. MH-BH**—Mostly concerned with pathology and medical treatment. Author thinks stimulating climatotherapy important in conjunction with surgery. Statistics of cures and deaths are misleading and authorities differ. He cannot compare efficiency of high-level coast and lowland climates. *Subject Heading:* **Climatotherapy.**—*C.E.P.B.*

8–133 551.586:615.8

Rominger, E., **See-Kuren im Kindesalter.** [Marine health resorts in childhood.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* (1):18–23, **1949.** 22 refs. **MH-BH**—Diseases are classified into those which benefit from sea climate and those which do not. The biological action of factors of marine climates is discussed. Figures show effect of baths of different temperatures on pressure of oxygen and CO_2 in body, and on body temperature. *Subject Headings:* **Climatotherapy, Marine climates.**—*C.E.P.B.*

8–134 551.586:615.8

Sauer, Walter, **Das Heilklima der See bei chronischer Bronchitis und Bronchiektasen.** [The curative climate of the sea in chronic bronchitis and bronchial dilation.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* (1):23–30, **1949. MH-BH**—Children sent to the North Sea coast with affections of the upper air passages, especially adenoids and tonsilitis, mostly heal quickly. Pathology and diagnosis of bronchial dilation are described in detail. Hitherto long cures in a dry hot climate have been recommended but author thinks long residence in a sea climate is also favorable, except in summer. Damp rainy weather with sea winds is best. *Subject Headings:* **Climatotherapy, North Sea Coast.**—*C.E.P.B.*

8–135 551.586:615.8

Ullmann, Kurt, **Die Behandlung der Knochen- und Gelenktuberkulose an der See.** [The treatment of bone and joint tuberculosis at the sea.] *Annalen der Meteorologie, Medizin-meteorologische Hefte,* (1):50–57, **1949.** 9 figs., **MH-BH.** Goeters, Walter, **Die Bedeutung des Nordseeklimas für die Behandlung der extrapulmonalen Tuberkulose im Kindesalter.** [The importance of the North Sea climate for the treatment of extrapulmonary tuberculosis in childhood.] *Ibid.,* (1):57–61, **1949.** Effenberger, H., **Zum Einfluss des Nordseeklimas auf die Lungentuberkulose Erwachsener.** [The influence of the North Sea climate on pulmonary tuberculosis in adults.] *Ibid.,* (1):61–65, **1949.** 3 figs. **MH-BH**—These three papers emphasize the beneficial effect of the climate of the North Sea coast of Germany in tuberculosis and give details of treatment. Ullmann describes bioclimatology of Sahlenburg (stimulating but mild in winter; high wind speed and cooling power; frequent weather changes). Goeters considers that the stimulating climate tones up the body infected by extrapulmonary consumption; open air treatment in sea winds and sun with short sea baths is as favorable as mountain climate. Effenberger compares mild insular climate of Fohr favorably with South Germany and St. Blasien. *Subject Headings:* **Climatotherapy, Germany, North Sea Coast.**—*C.E.P.B.*

MISCELLANEOUS APPLICATIONS

VISIBILITY

8–136 551.591.1:551.501.42

Cena, Guiseppe, **Sulla misure della visibilità con speciale riguardo a quella notturna.** [On measurement of visibility with special regard to night observations.] *Rivista di Meteorologia Aeronautica,* 9(2):48–53, April–June **1949.** 2 figs., 5 refs., 5 equations. **MH-BH**—Discussion of theory of visibility with nomograms for calculating relationships under varying nocturnal conditions (complete darkness, moonlight or twilight) and tables for determining visibility at night by observing the distance a 50 or 200 candle power electric lamp could be seen under varying illumination conditions. *Subject Headings:* **Visibility measurements, Computation tables.**—*M.R.*

OPTICAL PHENOMENA

8–137 551.593.652

Dessens, Henri, **Les altocumulus lenticularis margarodes. Observation des brillantes colorations des altocumulus nacrés; interpretation très simple par interférences dues à de minces lamelles de glace.** [Iridescent altocumulus lenticularis. Observations of the brilliant coloration of nacreous altocumulus; very simple explanation through interference due to thin flakes of ice.] *Annales de Géophysique,* 5(4):264–274, Oct.–Dec. **1949.** 9 figs., 13 refs. **MH-BH**—The colors observed on iridescent altocumulus lenticularis, as well as on nacreous clouds, can be attributed to interference of sunlight passing through numerous infinitesimal ice spicules, rather than to water clouds as has been supposed heretofore. The author cites Weickmann, Langmuir, Schaefer, and Woolard to support his argument. Temperatures at heights of the clouds observed and photographed on Sept. 10 and 12, Oct. 16 and 25, and Nov. 1, 1949 at St.-Gaudens and Puy de Dôme were so low that the probability of their being of water was slight. The crucial consideration is whether or not the ice prisms are oriented in one plane or are heterogeneously distributed as would be the case of falling (spirally) in calm air. *Subject Headings:* **Nacreous clouds, Iridescent altocumulus.**—*M.R.*

ELECTRICAL PHENOMENA

8–138 551.594 551.510.535

Israël, H. and Kasemir, H. W., **In welcher Hoehe geht der weltweite luftelektrische Ausgleich vor sich?** [At what height does atmospheric electric equilibrium take place?] *Annales de Géophysique*, 5(4):313–324, Oct.–Dec. **1949.** 3 figs., 2 tables, 16 refs., 23 equations. French and German summaries. **MH-BH**—Integration of the partial derivatives to find the time that would be required for a charge introduced at a point in a conductive layer sandwiched between two nonconductive layers to be uniformly distributed throughout the former layer. This theory and calculation is applied to the ionospheric layers over the globe. *Subject Headings:* **Atmospheric electricity, Ionospheric layers.**—*M.R.*

8–139 551.594.21

Gunn, Ross, **The free electrical charge on precipitation inside an active thunderstorm.** *Journal of Geophysical Research*, 55(2):171–178, June **1950.** 7 figs., table, 6 refs., equation. **MH-BH**—Results of a number of measurements obtained on July 24, 1945 at seven levels up to 20,000 feet, near Minneapolis, are tabulated, shown on graphs and interpreted. The 0° isotherm was at 14,000 feet, the maximum charge at 7,500 feet at a temperature of 10°C. where snow, hail, etc., melt to form rain. The charge at 5 and at 20 thousand feet was less than 25% as great as at 7,500 feet. Improved equipment which measured charge on surface of airplane, and also on the actual droplets of precipitation without the latter touching the airplane, is described. *Subject Heading:* **Thunderstorm electricity.**—*M.R.*

8–140 551.594.221

Fritsch, V., **Einige Untersuchungen an Blitzschutzerdungen.** [Some investigations on grounding of lightning rods.] *Schweizerischer Elektrotechnischer Verein, Bulletin*, 40(11):354–359, **1949.** 11 figs., 7 tables, 2 refs., equations. (Reprint available.) **MH-BH**—Experiments with high frequency currents on various types of lightning rod grounds, described and illustrated. Variations in resistance of the grounds, with varying weather conditions (rainfall, temperature change, frosts, thunderstorms and melting snow) and by seasons, shown on graphs. Experiments made during 1942 and 1943 in Absroth, Czechoslovakia. *Subject Headings:* **Lightning protection, Czechoslovakia.**—*M.R.*

8–141 551.594.221:629.13

Garnett, H., **Aircraft struck by lightning.** *Meteorological Magazine, London*, 79(934):121–122, April **1950.** **MH-BH**—*Subject Headings:* **Lightning, Aviation.**

8–142 551.594.221

Treven, Karl, **Blitzbildung, Blitzmessung, Blitzschutz.** [Formation, measurement and protection against lightning.] From a discourse by Viktor Aigner at the Scientific Society in Klagenfurt. *Wetter und Leben*, 2(5–6):126–130, Oct. **1949.** **DWB**—Describes a subterranean laboratory in level country for measuring electric and magnetic fields and summarizes results. Development of a lightning flash was followed with a high-tension cathode-ray oscillograph at Monte Generoso near Lugano. Potentials and currents in unearthed conducting masts with near flashes, and experiments with model conducting systems and buildings, are briefly described. *Subject Headings:* **Lightning, Lightning protection.**—*C.E.P.B.*

AURORA

8–143 551.594.5

Störmer, Carl, **Quelques résultats des observations et des mesures photographiques d'aurores boréales dans la Norvège méridionale depuis 1911.** [Some results of the observations and photographic measurements of aurora borealis in southern Norway since 1911.] *Chalmers University of Technology, Transactions*, (*Electronics Dept.* 14), No. 90, **1949.** 34 p. 21 figs., 5 tables, 29 refs. **MH-BH**—Systematic analysis of the data from 35,000 pictures of the aurora which the author has made since 1923, and earlier data going back to 1911. Height-frequency diagrams for the various types of auroras, orientation, variations of heights as a function of hour, upper limits of rays, sunlit auroras, details of some of the most remarkable

displays, including a map of Scandinavia showing geographical distribution of the phenomena, presented. *Subject Headings:* **Auroras, Norway.**—*M.R.*

8–144 551.594.5:550.385

Nagata, Takesi, **Development of a magnetic storm: The southward shifting of the auroral zone.** *Journal of Geophysical Research*, 55(2):127–142, June **1950.** 9 figs., 2 tables, 13 refs., 8 equations. **MH-BH**—Data from a number of observatories on the auroral and magnetic disturbance of April 30, 1933 (during the 2nd International Polar Year) is analyzed and interpreted theoretically. The southward movement of the auroral zone shows a strong correlation with the hourly increase in intensity on a world-wide basis. This may be due to increase in intensity of the equatorial current-ring, (Störmer) not to the increase in intensity of the corpuscular stream. Other theories (of Chapman, Ferraro and of Alfvén) are considered. *Subject Headings:* **Auroral zones, Magnetic storms.**—*M.R.*

8–145 551.594.51:551.521.61

*Petrie, W., **The near-infrared spectrum of the polar aurora.** *Journal of Geophysical Research*, 55(2):143–151, June **1950.** fig., 4 tables, 10 refs., 2 equations. **MH-BH**—Four auroral spectra, obtained with a grating spectrograph at Saskatoon, Saskatchewan, are analyzed and one of them illustrated. Evidence exists that He(I) atoms are excited to 24 electron-volts, and other lines [N(I) and O(I) and several N_2 bands] are present at lower energy levels. Intensity of O(I) lines indicates excitation temperature of 7,000°K, with evidence of large proportion of N_2 molecules having dissociated at height of 60 miles. *Subject Headings:* **Infrared radiation, Auroral spectra.**—*M.R.*

ACOUSTICAL PHENOMENA

8–146 551.596.1

*†Crary, A. P., **Stratosphere winds and temperatures from acoustical propagation studies.** *Journal of Meteorology*, 7(3):233–242, June **1950.** 16 figs., 7 tables, 12 refs., equation. **DWB, MH-BH**—Winds and temperatures at 30–60 km. levels are calculated from observations made by acoustical methods in Panama, Bermuda (1948–1949), and in New Mexico and on the east coast of the U. S. at other times. Results indicate lower temperatures than heretofore deduced, owing to wind factor having been neglected. East winds occur generally in summer, and west winds in winter, over Alaska. No diurnal variation in temperature at 30–60 km. was found. *Subject Headings:* **Anomalous sound propagation, Acoustical phenomena.**—*M.R.*

OCEANOGRAPHY AND HYDROGRAPHY

8–147 532.77:551.46

Seliakov, H. IA, **Nekotorye nabliudeniia nado l'dom i protsessami, sviazannymi c ego obrazovaniem.** [Some observations on ice and the processes connected with its formation.] *Akademiia Nauk, SSSR, Doklady*, 70(5):821–824, **1950.** 4 figs., 4 refs. **DLC**—In connection with studies of the freezing of rivers and seas in the Arctic, a number of conclusions were reached regarding method of formation of ice crystals, propagation of freezing and thawing, effect of container, types of crystals, evaporation of crystals and energy released during freezing process. *Subject Headings:* **Freezing nuclei, Oceanography, Arctic.**—*M.R.*

8–148 551.465(02)

Shuleikin, Vasilii V., **Ocherki po fizike moria.** [Outlines of the physics of the sea.] Moscow, Izdatel'stvo Akademii Nauk, SSSR, **1949.** 334 p. 190 figs. **DLC**—A readable, yet scholarly presentation of the basic problems of oceanography, with many excellent illustrations (both photographic and schematic) of scores of instruments used in oceanography and hydrography, as well as charts, pertinent scenes, etc. A long chapter at the beginning traces the history of the science from the earliest voyages to the present, with emphasis on instrumentation. The arrangement of the material follows a rational pattern: (1) the sun as source of energy for the atmospheric and oceanic movements, (2) heat or energy exchange in the sea, (3) effect of oceans on continents, (4) recurrent phenomena in the hydrologic cycle, (5) cause or mechanism of ocean currents, (6) wave phenomena, (7) tides, (8) optical and (9) acoustical

properties of the sea, and finally some problems of marine biology and fisheries. A great deal of original material and research is presented in this smaller and more popular edition of the author's voluminous work (**Fizika moria,** [Physics of the sea.] See item 2–184) and the edition would lend itself very well to translation. The author is now chief of the Hydrometeorological Service of the U.S.S.R. and a member of the Akademiia Nauk. *Subject Headings:* **Oceanography, Hydrography, Textbooks, U.S.S.R.**—*M.R.*

8–149 551.311.17:551.46

Defant, A., **Konvektion und Eisbereitschaft in polaren Schelfmeeren.** [Convection and probability of ice in polar shelf water.] *Glaciers and Climate. Geografiska Annaler,* 31(1–4):25–35, **1949.** 4 figs., 3 tables, 4 refs., equations. **MH-BH**—*Subject Headings:* **Polar ice, Oceanography.**

8–150 551.46:532.59

Wiegel, Robert L., **Experimental study of surface waves in shoaling water.** *American Geophysical Union, Transactions,* 31(3):377–385, June **1950.** 10 figs., 18 refs., equation. **MH-BH**—A series of experiments were carried out in order to compare actual wave dimensions with those given by trochoidal theory for waves moving over a sloping beach. The shape of the elevation-time curves at a given point of "profiles" was generally found similar to that predicted by trochoidal theory as long as the waves were not in relatively shallow water ($D/L > 0.15$). In general Rayleigh's assumptions that a wave at any particular depth along a slope would have the same dimensions as in water of the same depth over a horizontal surface seemed to be valid except probably in the case of rapidly shoaling water (slopes steeper than 1–10 near the breaker zone). *Subject Headings:* **Breakers, Hydrodynamics, Oceanography.**—*I.L.D.*

PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON THUNDERSTORMS

By: *Harris P. Kramer*

EXPLANATORY NOTE

An exhaustive survey of the vast amount of material available on thunderstorms and the various phenomena associated with them would entail time and space beyond the scope of this publication. In this study only some 350 references have been searched and annotated, from which only about 250 of the more significant have been selected to be published here. The entries are arranged chronologically (by year) and alphabetically within each year.

The Outline of Contents printed below indicates the scope of the subject matter and serves as a more specialized supplement to the general index. Emphasis is placed on studies of the dynamics, rainfall, electricity, forecasting and distribution of thunderstorms. Space limitations prevent including much material on the associated phenomena of lightning and thunder.

Selections are made on the following bases: significance in the development of theory of thunderstorms; good reference or data sources; historical value or recency; and particular geographical location.

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THUNDERSTORMS

1875–1900

H–1 551.515.4

Abercromby, R., **On the barometric fluctuations in squalls and thunderstorms.** *Royal Meteorological Society, Quarterly Journal,* 2:450–454, **1875.** 3 figs. **DLC**—Two examples cited of the type of storms in which the barometer rises. Readings charted. Rain appears to occur in the middle of the sudden pressure rise. *Subject Headings:* **Thunderstorms, Pressure variations.**

H–2 551.515.4(77)

Clayton, H. H., Jr., **The thundersqualls of July 5, 1884.** *American Meteorological Journal,* 1:263–272, **1884.** 2 maps. **DLC**—Detailed observations of storms, conditions of formation, occurrence, wind velocities, rainfall, hail and lightning, made in vicinity of lower Missouri and upper Mississippi valleys during period of severe and destructive thunderstorms. *Subject Headings:* **Thunderstorms, Central United States.**

H–3 551.515.4(74)

Davis, William Morris, **Thunderstorms in New England in the summer of 1885; a report on observations made by volunteer observers for the New England Meteorological Society.** *American Academy of Arts and Sciences, Proceedings,* 22:14–58, **1887.** 8 figs., 6 tables, refs. **DLC**—Thunderstorms observed as special investigation of New England Meteorological Society, summer of 1885. Detailed records kept. General account of storms through summer is given. Control of thunderstorms by the larger cyclonic circulation and direction of motion of thunderstorms reviewed. *Subject Headings:* **Thunderstorms, New England.**

H–4 551.515.4:551.509

§Conger, Norman B., **Report on the forecasting of thunderstorms during the summer of 1892.** *U. S. Weather Bureau, Bulletin* No. 9, Washington, D. C., **1893.** 54 p. 6 charts, 3 tables. **DWB**—General discussion of thunderstorms. Brief description of atmospheric conditions which prevailed during thunderstorm investigation. Reports for New England and Ohio. Tables of thunderstorms and forecasts in New England. Charts show air pressure and temperature on different dates with thunderstorms. *Subject Headings:* **Thunderstorm forecasting, New England, Ohio.**

H–5 551.515.4(74)

Ward, Robert DeC., **Thunderstorms in New England during the years 1886 and 1887.** *Harvard College, Astronomical Observatory, Annals,* 31, pt. 2:261–343, **1893.** 22 figs., 2 tables. **DLC**—Summarized in *American Meteorological Journal,* 9:21–28, and 211–215, **1892.** **DWB**—Accurate accounts kept by self-recording instruments at Blue Hill Observatory of the changes in temperature, humidity, and pressure and of the amount of rainfall, during the passage of a typical thunderstorm. *Subject Headings:* **Thunderstorms, New England.**

H–6 551.515.4:551.515.8

Durand-Gréville, E., **Les grains et les orages.** [Squalls and thunderstorms.] *Académie des Sciences, Paris, Comptes Rendus,* 118:829–832, April **1894.** **DLC**—Early conclusive investigation and clarification of thunderstorms as accompanying barometric lows, part of a complex system of the squall, (le grain). *Subject Headings:* **Thunderstorms, Squalls, Fronts.**

H–7 551.515.4:551.511

Bezold, Wilhelm von, **Ueber Gewitterbildung und labiles Gleichgewicht der Atmosphäre.** [On thunderstorms and unstable equilibrium in the atmosphere.] *Meteorologische Zeitschrift,* 12:121–125, April **1895.** refs. **MH-BH**—Author gives reasons for expecting a difference in the daily and yearly thunderstorm periods when inland observations are compared with those made on or near the sea. Two types of thunderstorms are described: heat and cyclonic. Atmospheric conditions for thunderstorms discussed. Tables record thunderstorms by month and area for Scotland, Ireland, England and Wales, Holland, France, Spain, Algiers, Italy and Malta. Good review in English by Herman D. Stearns entitled: **Effect of proximity to the sea on thunderstorm periods.** *Monthly Weather Review,* 26:452–454, **1898.** *Subject Headings:* **Thunderstorms, Instability, Great Britain, Netherlands, France, Spain, Algiers, Italy, Malta.**

H–8 551.515.4(47)

†Ward, Robert DeC., **Recent foreign studies of thunderstorms: V. Russia.** *American Meteorological Journal,* 11:364–368, 435–441, **1894–1895.** **DWB**—Fifth of series reviewing work in Great Britain, Germany, France, Italy, respectively, on thunderstorms at that time. *Subject Headings:* **Thunderstorms, U.S.S.R., Great Britain, Germany, France, Italy.**

1900–1919

H–9 551.511

Bénard, Henri, **Les tourbillons cellulaires dans une nappe liquide transportant de la chaleur par convection en régime permanent.** [Cellular eddies in a layer of liquid carrying heat by convection in regular fashion.] *Annales de Chimie et de Physique, Paris*, 7 Ser., 23:62–144, **1901.** 28 figs., tables, refs., equations. **DWB**—Basic paper in the explanation of convection, noting the cellular nature of convection patterns within an unstable layer of liquid. *Subject Headings:* **Convection, Fluid mechanics.**

H–10 551.515.4(759)

Bily, Joseph, Jr., **Thunderstorms at Tampa, Fla.** *Monthly Weather Review*, 32:457–460, **1904.** fig., 8 tables. **DWB**—Descriptive analyses of thunderstorms in this locality. Statistical study of duration, frequency, and relation between average monthly rainfall and average monthly number of thunderstorms. *Subject Headings:* **Thunderstorms, Florida.**

H–11 551.515.4

Loisel, J., **Squalls and thunderstorms.** *Monthly Weather Review*, 37:237–239, **1909.** 7 figs., 5 refs. Translated by Cleveland Abbe, Jr., from *La Nature, Paris*, 37:105–108, **1909. DWB**—Discussion of thunderstorms accompanying barometric lows, i.e., in relation to "squall zones," particularly in regards to forecasting. *Subject Headings:* **Thunderstorms, Squalls, Thunderstorm forecasting.**

H–12 551.515.4:551.577

§Süring, R. and Mey, A., **Uber den Zusammenhang zwischen Gewitterzügen und Niederschlagsgebieten.** [On the relation between thunderstorm tracks and precipitation regions.] *K. Preussisches Meteorologisches Institut, Berlin, Abhandlungen* 3, No. 5, **1910.** 27 p. 40 charts, tables, refs., equations. **DWB**—Synoptic analyses of various thunderstorm conditions, pressure, temperature, precipitation areas, etc., over Germany. *Subject Headings:* **Thunderstorms, Thunderstorm rainfall, Germany.**

H–13 551.515.4

†§Humphreys, William J., **The thunderstorm and its phenomena.** *Monthly Weather Review*, 42:348–380, **1914.** 28 figs., 22 refs., equations. **DWB**—Thorough analytical discussion of characteristics and physics of thunderstorms, such as turbulence in cumulus, convection, instability, periods of thunderstorm activity, geographic distribution, thunderstorm pressures, temperatures, humidity, etc. Includes thunderstorm weather maps of U. S. which author analyzes as specific examples, and diagrams of air movements within thunderstorms. Lightning also discussed. *Subject Headings:* **Thunderstorm dynamics, Lightning.**

H–14 551.515.4(73)(71)

*Alexander, William H., **Distribution of thunderstorms in the United States.** *Monthly Weather Review*, 43:322–340, **1915.** extensive tables. **DWB**—Charts show monthly and annual numbers of thunderstorms for ten years, 1904–1913, over U. S. and southern Canada. Graphic charts are supplemented by detailed tabulated data for individual stations, having fairly long records, showing number of storms for each month of period covered. *Subject Headings:* **Thunderstorms, United States, Canada.**

H–15 551.515.4(862)

Cornthwaite, H. G., **Panama thunderstorms.** *Monthly Weather Review*, 47:722–724, **1919.** 4 figs., 2 tables. **DWB**—Chart shows average number of days with thunderstorms compared with average monthly rainfall at Canal Zone stations. Little data. *Subject Headings:* **Thunderstorms, Panama.**

1920–1929

H–16 551.515.4

Brooks, C. F., **The local, or heat, thunderstorm.** *Monthly Weather Review*, 50:281–284, **1922.** fig. **DWB**—Analytical description of this type of storm, stating necessary meteorological conditions, geographical location, etc. *Subject Headings:* **Thunderstorms, Convection.**

H–17 551.515.4:551.588

Hallenbeck, Cleve, **The topographic thunderstorm.** *Monthly Weather Review*, 50:284–287, **1922.** fig. **DWB**—Comprehensive discussion of the influence of topographic features in modifying and in actually producing thunderstorms. *Subject Headings:* **Thunderstorms, Topographic effects.**

H–18 551.515.4(41)

Newnham, E. V., **On the formation of thunderstorms over the British Isles in winter.** *Great Britain, Meteorological Office, Professional Notes,* 3(29):78–81, 1922. 5 figs., refs. **DWB**—Theory of formation of winter thunderstorms over England, due to heat imparted by the warm ocean to the lower layers of cold currents of air. Evidence given to support this. *Subject Headings:* **Thunderstorms, Great Britain.**

H–19 551.515.4(73)

*Alexander, William H., **Distribution of thunderstorms in the United States.** *Monthly Weather Review,* 52:337–343, 1924. 13 figs., 2 tables. **DWB**—Contains isoceraunic (equal frequency of thunderstorm days) maps, prepared from U. S. Weather Bureau records of thunderstorm occurrence at stations over the U. S., covering a 20-year period and extensive tables of days with thunderstorms at Weather Bureau stations 1904–1923. *Subject Headings:* **Thunderstorms, United States.**

H–20 551.515.4(771)

†*Alexander, W. H., Brooks, C. F., and Burnham, G. H., **Thunderstorms in Ohio during 1917.** *Monthly Weather Review,* 52:343–348, 1924. 7 figs., 2 tables, 13 refs. **DWB**—First air mass or frontal study of thunderstorms in U. S. Purposes of study were to determine origin, distribution, number, frequency, extent, attending phenomena, etc., of storms in Ohio, 1917, and to trace history of individual storms. Figures show hourly progress of thunderstorm belt across state. Tables show geographical and seasonal incidence of thunderstorms and diurnal incidence of thunderstorms by quarters, percentages of days with thunderstorms. *Subject Headings:* **Thunderstorms, Ohio.**

H–21 551.515.4 551.594.21

†Kähler, Karl F., **Die Elektrizität der Gewitter.** [The electricity of thunderstorms.] Berlin, Borntraeger, 1924. 148 p. 8 figs., 192 refs., equations. **DWB, DLC**—Thorough analytical discussion of thunderstorms, causes, dynamics and electrical phenomena. *Subject Headings:* **Thunderstorm electricity, Thunderstorm dynamics.**

H–22 551.515.4(98)(99)

Kallio, Niilo, **Die Erstreckung des Gewitters nach dem Nord- und Südpol.** [The extension of thunderstorms towards the north and south poles.] *Societas Scientiarum Fennica, Commentationes Physico-Mathematicae,* 2, No. 10. [1920's.] 11 p. map, tables, refs. **DWB**—Brief, organized summary of reports of thunderstorms in polar regions from numerous sources. *Subject Headings:* **Thunderstorms, Arctic, Antarctic.**

H–23 551.515.4

Brooks, C. E. P., **Distribution of thunderstorms over the globe.** Great Britain, Meteorological Office, *Geophysical Memoirs,* 3(24):147–164, 1925. 7 figs., 8 tables, refs. **DWB**—Contents includes sources of data, distribution of thunderstorm frequency, total number during year, annual and diurnal variation of frequency, and variation in thunderstorm frequency with height. Results of this survey are frequently quoted. *Subject Heading:* **Thunderstorms.**

H–24 551.511

Brunt, D., **Convective circulation in the atmosphere.** *Meteorological Magazine, London,* 60:1–5, 1925. 3 refs. **DLC**—Cellular mechanism noted by observing evaporation of fluid; process applicable to convective behavior in the atmosphere. *Subject Headings:* **Convection, Fluid mechanics.**

H–25 551.515.4 551.594.21

Gockel, Albert, **Das Gewitter.** [The thunderstorm.] Berlin, Ferd. Dümmlers, 1925. 316 p. 36 figs., 3 plates, tables, refs. **DWB**—Large complete work on thunderstorms, causes, dynamics, electrical phenomena, geographic distribution, hail, etc. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm electricity.**

H–26 551.515.4:632.187(797)

*Alexander, G. W., **Lightning storms and forest fires in the state of Washington.** *Monthly Weather Review,* 55:122–129, 1927. 5 figs., 8 tables, 4 refs. **DWB**—Thunderstorm types classified: cyclonic, anticyclonic, border (warm and cold wave) and combination types; tabulated according to annual and monthly and geographical distribution, and storms resulting in fires, 1925, 1926. Distribution of pressure and temperature over western U. S. resulting in thunderstorms for different types. *Subject Headings:* **Thunderstorms, Forest fires, Washington state.**

H–27 551.594.21

Kähler, Karl F. **Über die elektrischen Vorgänge im Gewitter.** [On the electrical processes in thunderstorms.] *Meteorologische Zeitschrift*, 44:441–453, **1927.** fig., table, 11+refs., 4 equations. **MH-BH**—Electrical phenomena in thunderstorms divided according to convective, frontal, and winter thunderstorms. *Subject Heading:* **Thunderstorm electricity.**

H–28 551.515.4

Köppen, W., **Jährliche Häufigkeit der Gewitter zwischen Felsengebirge und Ural.** [Yearly frequency of thunderstorms between Rocky Mountains and the Urals.] *Annalen der Hydrographie und maritimen Meteorologie*, 55:355–356, **1927.** chart, 2 refs. **DLC**—Determinations of frequency of thunderstorms over land and sea clarified on chart. *Subject Headings:* **Thunderstorms, Northern Hemisphere.**

1930–1934

H–29 551.594.21

Banerji, Sudhansu K., **The electrical field of overhead thunderclouds.** *Royal Meteorological Society, Quarterly Journal*, 56:305–334, **1930.** 23 figs., 16 refs. **DWB**—From examination of 18 storms over Colaba Observatory, India, in 1929, a thunderstorm model is proposed in which a region of high negative charge concentration at front of cloud precedes a region of high positive charge concentration, which in turn is followed by the rear negatively charged. *Subject Headings:* **Thunderstorm electricity, India.**

H–30 551.515.4(261)

Barlow, E. W., **Squalls at sea.** *Marine Observer*, 7:10–13, Jan. **1930.** 3 figs., table, refs. **DLC**—Description of phenomena of a line squall. Thunderstorms occurring in connection with a depression in the North Atlantic are of this type. *Subject Headings:* **Thunderstorms, Squalls, North Atlantic.**

H–31 551.515.4:551.509(47)

§Berg, A. E., **Synopticheskiye usloviya vozniknoveniya groz na territorii evropeiskoi chasti SSSR.** [Synoptic conditions for the occurrence of thunderstorms in the European part of the U.S.S.R.] *Geofizicheskii Sbornik*, 7(2):31–72, **1930.** fig., 38 charts. Summary and titles of charts in English. **DLC**—A series of charts shows the relation between air mass movements (along the 4 "polar" and 2 "ultrapolar" axes) and preferred areas for thunderstorm development in European USSR. Characteristics of thunderstorm development during outbreaks along individual axes are discussed, based on statistics from actual cases. Individual storms are described, as well as peculiar characteristics of regions most frequently affected by thunderstorms. The work is based on a long series of synoptic and climatological records (1881–1914) maintained at the Central Geophysical Observatory, Leningrad. *Subject Headings:* **Thunderstorm forecasting, Synoptic studies, U.S.S.R.**—*M.R.*

H–32 551.515.4(43)

Pernice, Erich, **Der Spreewald als Gewitterherd. Ein Beitrag zur Erklärung der Vorgänge in Gewitterherdgebieten.** [The Spreewald as a region of thunderstorm formation; a contribution to the explanation of processes in regions of thunderstorm origination.] Greifswald, H. Adler, **1930.** 71 p. 9 figs., 20 tables, refs. **DWB**—Discussion of thunderstorm causes, thermodynamics, etc., particularly applied to Spreewald region. *Subject Headings:* **Thunderstorm dynamics, Spreewald, Germany.**

H–33 551.511:551.558.1:551.577

†§Refsdal, Anfinn, **Der Feuchtlabile Niederschlag.** [The convective instability of precipitation.] *Geofysiske Publikasjoner*, 5, No. 12, **1930.** 71 p. 33 figs., 36 refs., equations. **DLC**—A fundamental treatise on various aspects of rain formation under conditions of convective instability. After a brief theoretical introduction a large number of actual cases are analyzed and illustrated with synoptic charts and sounding diagrams. Subjects considered are: superadiabatic gradients, release through weak upper fronts, and orographic thunderstorms associated with linear (frontal) formations, convective instability through nocturnal radiation, convective instability associated with cyclonic activity and finally the application of this theory to wave formation, cyclogenesis and to tropical and extratropical cyclones. *Subject Headings:* **Convection, Instability, Precipitation.**—*M.R.*

H–34 551.515.4(43)

§Reidat, Rudolf, **Gewitterbildung durch Kaltlufteinbruch in der Höhe.** [Thunderstorm formation through cold air intrusion aloft.] *Beiträge zur Physik der freien Atmosphäre*, 16(4):291–297, **1930.** 22 figs. **DLC**—A synoptic and aerological analysis of a thunderstorm situation which pre-

vailed in the vicinity of Berlin, July 1929. It is concluded that warm, convectively unstable air lying over North Central Europe (in a low pressure trough) was released by cold air which invaded the region in upper levels. Under such conditions intensity of the thunderstorm depends on surface topography or local heating. This theory has been previously advanced and rejected, but more evidence has recently brought general acceptance of it as one of the important mechanisms for setting of intense thunderstorms. *Subject Headings:* **Thunderstorm dynamics, Berlin, Germany.**—*M.R.*

H–35 551.515.4(931)

*Kidson, E. and Thomson, A., **The occurrence of thunderstorms in New Zealand.** *Journal of Science and Technology, Wellington, New Zealand,* 12:193–206, **1931.** 6 figs., 5 tables, 2 refs. **DLC**—Authors state that accurate statistical records of thunderstorms in New Zealand are scanty, but as much data as possible, since 1905, is here collected and analyzed. Frequency, distribution, annual and diurnal variations are charted. *Subject Headings:* **Thunderstorms, New Zealand.**

H–36 551.515.4

†Raethjen, Paul, **Zur Thermo-Hydrodynamik der Böen.** [On the thermo-hydrodynamics of squalls.] *Meteorologische Zeitschrift,* 48:11–22, **1931.** 8 figs., table, 18 refs., 11 equations. **DWB**—The source of energy in a squall line and its effect on the air currents of the squall are discussed theoretically. Diagrams show schemes of squalls with and without cold air intrusions at the ground, portraying dynamics of the cold air and unstable warm air, the front, rain and pressure phenomena. References are made to basic early works in dynamics of squalls. *Subject Headings:* **Thunderstorm dynamics, Squalls.**

H–37 551.515.4

†*Scherhag, Richard, **Über die atmosphärischen Zustände bei Gewittern. (Unter besonderer Berücksichtigung der Ostgewitter und mehrtägiger Gewitterperioden).** [On atmospheric conditions for thunderstorms with special consideration of easterly thunderstorms and thunderstorm periods over several days.] Berlin, **1931.** 96 p. 100 figs., 26 tables, 110 refs., equations. (Inaugural dissertation.) **DWB**—Excerpt appears in *Meteorologische Zeitschrift,* 48(6):201–207, **1931.** 2 figs., 4 tables, refs., 5 equations. **MH-BH**—Various conditions for thunderstorm occurrence are outlined and discussed: falling pressure, rising temperature, high humidity, instability of air, cold air masses, etc. Thorough, analytical work. *Subject Heading:* **Thunderstorm dynamics.**

H–38 551.515.4:551.594.25

Banerji, S. K. and Lele, S. R., **Electrical charges on raindrops.** *Nature, London,* 130:998–999, **1932. DLC**—Established mean values of free electric charge on individual natural raindrops falling from active thunderstorms, for positive and negative droplets. *Subject Headings:* **Thunderstorms, Electricity of precipitation.**

H–39 551.515.4(481)

*Schou, Georg, **Gewitter in Norwegen.** [Thunderstorms in Norway.] *Geofysiske Publikasjoner,* 9, No. 7, **1932.** 32 p. 9 figs., 12 tables, refs. **DWB**—Distribution, variations, conditions, etc., of thunderstorms in Norway. *Subject Headings:* **Thunderstorms, Norway.**

H–40 551.515.4(41)

*Bower, S. Morris, **Census of thunderstorms in the British Islands, 1925–1936. Summer thunderstorms.** Annual reports 1, 2, 3, Huddersfield, **1931–1933,** etc. About 30 p. to a report. maps, tables. **DWB**—Reports of main statistical results of summer surveys of thunderstorms in British Isles. *Subject Headings:* **Thunderstorms, Great Britain.**

H–41 551.515.4(94)

Barkley, Henry, **Thunderstorms in Australia.** *Australia, Bureau of Meteorology, Bulletin* No. 19, **1934.** 6 p. map, 2 tables. **DWB**—Brief article discusses the geographical distribution and monthly and hourly variations of thunderstorms in Australia. Map gives isobronts showing average annual frequency over the country. *Subject Headings:* **Thunderstorms, Australia.**

H–42 551.515.4

†Böhme, G., **Der aerologische Zustand der Atmosphäre bei Gewitterlagen.** [The aerological state of the atmosphere for thunderstorm conditions.] *Zeitschrift für angewandte Meteorologie,* 51:273–281, **1934.** 5 figs., 11 refs. **MH-BH**—Brief review of thunderstorm classification. Discussions of cold front and warm front thunderstorms. Examples. *Subject Heading:* **Thunderstorms.**

H–43 551.515.4

Ficker, H. von, **Über die Entstehung lokaler Wärmegewitter.** [On the origin of local heat thunderstorms.] *Berlin, Preussische Akademie der Wissenschaften, Phys.-math. Klasse, Sonderausgabe aus den Sitzungsberichten,* **1931–1934.** Part I. 14 p. 3 figs., refs. **DWB**—Review of common theories of heat thunderstorm occurrence and research in primarily aerological material. II. **Die Vorgänge in der freien Atmosphäre über Lindenberg am 2. und 3. Juli 1914.** [Processes in the free atmosphere over Lindenberg July 2 and 3, 1914.] 54 p. 16 figs., 7 tables, equations. Aerological conditions of lower 3 or 4 km. of troposphere considered. III. **Die Starkregen in Berlin und Norddeutschland am 14. und 15. Juli 1932.** [The heavy rain in Berlin and north Germany July 14 and 15, 1932.] 23 p. 13 figs., refs. Synoptic analysis of thunderstorm situation. IV. **Untersuchung der Vorgänge in der freien Atmosphäre an Gewittertagen.** [Research in atmospheric conditions on thunderstorm days.] 28 p. 5 figs., 4 tables, refs. Detailed analysis. *Subject Headings:* **Thunderstorms, Germany.**

H–44 551.515.4(41)(4)

*Marshall, W. A. L., **The mean frequency of thunder over the British Isles and surrounding areas.** *Royal Meteorological Society, Quarterly Journal,* 60:413–424, **1934.** 3 figs., table, refs. **DWB**—Charts and tables illustrate records of from 10 to 30-year periods. Brief data for Oslo, Paris, Brussels, Charlesville and Hamburg included also. *Subject Headings:* **Thunderstorms, Great Britain, Europe.**

1935–1939

H–45 551.515.4(26)

Barlow, E. W., **Thunderstorms at sea.** *Marine Observer,* 12:49–52, April **1935.** 2 figs., refs. **DLC**—Chart shows percentage of days with thunder heard during the year in the world. Four types of thunderstorms which are observed at sea are described and examples given. Thunderstorms from line squalls, pamperos, tropical cyclones, are considered and references given. Formation of a thunderstorm, frequency of thunderstorms at sea, accounts of ships struck by lightning, and various phenomena, ball lightning, St. Elmo's fire, etc., are discussed. *Subject Heading:* **Thunderstorms.**

H–46 551.515.4:551.578.7(479)

Courdiani, J., [**Thunderstorms and hail in Kahketia.**] Title in Georgic, Russian, French. *University of Tiflis, Publication,* **1935.** Geographical Society of the Georgian S.S.R. 44 p. figs., map, tables. Summary in Russian. **MH-BH**—*Subject Headings:* **Thunderstorms, Hail, Georgia, U.S.S.R.**

H–47 551.515.4(494)

†Ekhart, E., **Geographische und jahreszeitliche Verteilung der Gewitterhäufigkeit in den Alpen.** [Geographical and yearly distribution of thunderstorm frequency in the Alps.] *Beiträge zur Geophysik,* 46:62–90, **1935.** 9 figs., table, 22 refs. **DLC**—Based on observations from 405 stations in the Alps mainly during 1921–1930. Three well-defined regions are shown in the results. The relation between altitude and frequency is treated and reference made to conclusions of other meteorologists. *Subject Headings:* **Thunderstorms, Alps.**

H–48 551.515.4(61) 551.515.8

Piersig, Walter, **Die Gewitterhäufigkeit im Meeresgebiet vor der Nordwestafrikanischen Küste: ihr jahreszeitlicher Gang und ihre Verteilung zur Lage der Tropikfront.** [Thunderstorm frequency in the maritime region for the northwest African coast: their annual variation and distribution according to tropical front situations.] *Annalen der Hydrographie,* 63:461–466, **1935.** 2 figs., 3 tables, 5 refs. **DLC**—Five years records for African coast examined. Thunderstorms preferably occur in relation with intertropical front. Slight vertical extent of the air mass in trade wind makes these of little importance in formation of thunderstorms. *Subject Headings:* **Thunderstorms, Tropical fronts, North Africa.**

H–49 551.515.4:632.187(79)

Stevens, W. R., **Meteorological conditions preceding thunderstorms on the national forests.** *Monthly Weather Review,* 62:366–370, **1934.** figs., tables. *Ibid.,* 63:183–184, **1935. DWB**—1) Analysis of meteorological conditions that ordinarily precede occurrence of thunderstorms in western and central Oregon—to enable forewarning to fire officials. 2) Meteorological conditions and thunderstorm activity the same and the next day are related in an attempt to establish forecasting aids to warn forest fire officials. *Subject Headings:* **Thunderstorm forecasting, Forest fires, Oregon.**

H–50 551.515.4:551.511

Arakawa, H., **Theory of convection thundershowers, convection cyclones and anticyclones.** *Geophysical Magazine, Tokyo,* 10(1):43–66, **1936.** 11 figs., tables, refs., numerous equations. **DWB**—

Fundamental principles of convection and hydrodynamical theory of air on the rotating globe used as basis for theoretical considerations of characteristics of secondary circulations. *Subject Headings:* **Thunderstorm dynamics, Convection, Cyclones, Mechanics of the atmosphere.**

H–51 551.515.4(47)

*But, I. V. and Iakovlev, V. V. (Rostov), **Grozy v Asovo-Chernomorskom krae.** [Thunderstorms in Azov-Black Sea area.] *Meteorologiia i Gidrologiia*, 1(8):3–10, Aug. **1936.** 9 figs., table, 3 refs. **DLC**—Review in German, *Annalen der Hydrographie und maritimen Meteorologie*, 66:479–480, **1938.** **DLC**—A statistical analysis of thunderstorm frequency, based on records of 45 stations in the Don-Black Sea-North Caucasus area, (1922–1934), tabulated according to time of day, region and intensity of storm. Three eight-hour periods of day used, seven regions, and three degrees of intensity. The resulting index of thunderstorm activity is plotted for each of the 7 districts, by months, and a chart presented of annual number of thunderstorms in the entire area. *Subject Headings:* **Thunderstorms, U.S.S.R.**—*M.R.*

H–52 551.515.4 551.594.21

†Evans, E. A. and McEachron, K. B., **The thunderstorm; theories of thundercloud electrification—field measurements—characteristics of thunderstorms—causes of storm formation and maintenance—predictions—applications of thunderstorm knowledge.** *General Electric Review*, 39(9):413–425, Sept. **1936.** 12 figs., table, 25 refs. **DLC**—A comprehensive work written to give engineers a general understanding of thunderstorms. Various theories of thundercloud electrification reviewed and compared. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm electricity.**

H–53 551.515.4(492)

Everdingen, E. van, **The distribution of thunder in Holland.** *Royal Meteorological Society, Quarterly Journal*, 62:433–434, **1936.** fig., refs. **DWB**—Brief article calls attention to Dutch work on thunder frequency. Map submitted showing yearly numbers of "days with thunder heard" for western Europe. Concluded that maximum frequency of thunder in western Europe is found in Holland. *Subject Headings:* **Thunderstorms, Netherlands, Europe.**

H–54 551.515.4:551.573(776)

Jensen, J. C., **Evaporation and rainfall studies in the northwest Minnesota Lake region.** *American Philosophical Society, Proceedings*, 76:747–759, **1936.** 5 figs., 5 tables, 3 refs. **DLC**—One of the reports of progress on projects sponsored by the American Philosophical Society. The investigation was concerned largely with thunderstorm conditions and the effect of lakes on rainfall in such conditions. *Subject Headings:* **Thunderstorm rainfall, Minnesota.**

H–55 551.515.427:551.557(52)

Kabasawa, M., **Some relations between the movement of thermal thunderstorm and that of the upper air current.** *Meteorological Society of Japan, Journal, 2 Ser.*, 14:41–45, **1936.** 9 figs., 3 tables. In Japanese. Summary in English. **DWB**—Investigation of these relations in Kwanto district by means of pilot balloon observations 1930–1932. Concluded that heat thunderstorm movement coincides with flow of upper air currents; no relation to surface wind directions. Velocity of movement considered. *Subject Headings:* **Thunderstorms, Upper air currents, Japan.**

H–56 551.515.4(43)

§Rodewald, Martin, **Das norddeutsche Hochdruck-Gewitter vom 19. August 1932.** [The north German high pressure thunderstorm on Aug. 19, 1932.] *Annalen der Hydrographie und maritimen Meteorologie*, 63:23–29, **1935**; *ibid.*, 64:143–153, **1936.** 27 figs. (appended), table, refs. **DLC**—Concludes that such storms are probably caused by inflow of continental warm air above colder air while a cold current prevails in the upper air. The forecasting of such storms is dealt with briefly. *Subject Headings:* **Thunderstorms, Germany.**

H–57 551.515.4:551.506.3

*von Travniček, Ferd, **Über die säkularen Änderungen der Häufigkeit von Tagen mit Gewitter im Jahr.** [On the secular variations of the frequency of days with thunderstorms during the year.] *Zeitschrift für angewandte Meteorologie*, 53:96–103, **1936.** 2 tables. **DWB**—Includes analysis of data from yearbooks for 25 stations, from Adriatic to North Sea, of days with thunderstorms for varying periods, beginning 1874 in some cases. *Subject Headings:* **Thunderstorms, Western Europe.**

H–58 551.515.4:551.542(79)

§Ward, Robert Allen, **Pressure distribution in relation to thunderstorm occurrence on Oregon and Washington national forests.** *Monthly Weather Review*, 64:37–45, **1936.** 6 figs., 4 tables, 9 refs. **DLC**—Four types of pressure distribution over Pacific coast states are distinguished to which

thunderstorm occurrence can be related; their frequency and extent are discussed. Based on stud of 10 years synoptic charts, 1925-1934. *Subject Headings:* **Thunderstorms, Pressure variations Pacific Northwest.**

H–59 551.515.4(265

Webster, H. C., Munro, G. H., and Higgs, A. J., **Thunderstorms in the Tasman Sea and Cora Sea, March 1934.** *Meteorological Magazine, London*, 71:59–62, **1936.** fig., table. **DWB**—Analysi of sea thunderstorms based on wireless observations in March 1934. Positions of sources compare with fronts. Classification into frontal or non-frontal included. *Subject Headings:* **Thunderstorms Coral Sea, Tasman Sea.**

H–60 551.515.4:551.50

§Berry, F. A. and Maginnis, J., **Thunderstorm forecasting.** Pasadena, California, Institute c Technology, **1937.** 130 p. adiabatic and synoptic charts, tables. (Thesis.) **DWB**—Individua cases of thunderstorms, studied in order to determine a means of forecasting them from the synopti situation, combined with the upper air soundings. Types of thunderstorms, causes, etc. also dis cussed. *Subject Headings:* **Thunderstorm forecasting, Synoptic studies.**

H–61 551.515.4:551.594.6:55.038.

Bhar, J. M. and Syam, P., **Effect of thunderstorms and magnetic storms on the ionization of th Kennelly-Heavyside layer.** *Philosophical Magazine, London*, 7 Ser., 23:513–528, **1937.** 3 figs., tables, 6 refs., equations. **DLC**—Concludes that there is a marked relation between thunderstorm and ionization in E region; but such is doubtful between the latter and magnetic disturbances; whil no relation is found between thunderstorms and magnetic disturbance. *Subject Headings:* **Thunder storms, Ionosphere, Magnetic disturbances.**

H–62 551.515.4:551.50

Eredia, F., **Contributi allo studio dei fenomeni meteorologici durante i temporali.** [Contribu tion to the study of meteorological phenomena during thunderstorms.] *Rivista di Meteorologi Aeronautica*, 1(3–4):32–55, **1937.** 16 figs., refs., equations. **DLC**—A descriptive and theoretica discussion of various phases of thunderstorm activity, particularly as affecting aviation. Specia emphasis is given to wind and electrical fields of thunderstorms. Instruments for measuring wind gustiness, vertical velocities and potential gradient (by means of radiosondes with special attach ments) are described and illustrated. Barograms, thermograms and anemograms, made durin thunderstorms, are reproduced, showing extreme gustiness and variability in direction of wind *Subject Headings:* **Thunderstorm dynamics, Thunderstorm electricity, Methods of observation Aviation, Radiosondes.**—*M.R.*

H–63 551.594.2

*Simpson, George C. and Scrase, F. J., **Distribution of electricity in thunderclouds.** *Roya Society of London, Proceedings, Ser. A*, 161:309–352, **1937.** 22 figs., 4 tables, 10 refs., 7 equations **DWB**—A method of obtaining records of the sign of the potential gradient at different heights i thunderclouds is described. The region of separation of the upper positive charge and the lowe negative charge occurs at levels where temperature is well below freezing-point; for this reaso generation of upper charge is considered dependent on presence of ice crystals and not on water drops The position of the lower positive charge supports the idea of its generation by the "breaking drop" process. *Subject Heading:* **Thunderstorm electricity.**—*From author's summary.*

H–64 551.515.4(41

†*Thunderstorm Census Organization, Great Britain, **British thunderstorms.** Vol. 2, **1934–1937** 208 p. 68 figs., tables, refs. **DWB**—Thunderstorm data for British Isles. Lists and reviews o papers on thunderstorms. Accounts of various storms, lightning, etc. Much general material *Subject Headings:* **Thunderstorms, Great Britain.**

H–65 551.515.4(47

*Torbina, N. V., **Sinopticheskie usloviia groz na E. T. S.** [Synoptic conditions for thunder storms in European U.S.S.R.] *Meteorologiia i Gidrologiia*, 3(2):3–17, Feb. **1937.** 5 figs., 24 tables refs. **DLC**—A statistical analysis of thunderstorm frequency in U.S.S.R. according to frontal and air mass types. Also daily and monthly variations given. Most frequent types are: frontal (72%) of which 69% are cold front type; 55% occur behind cold front; and 60% in cold front occlusions Seventy six percent of the air mass thunderstorms occur in low pressure areas; 61% develop in Pola Continental air; 76% of warm sector thunderstorms develop in continental tropical air, showing th great instability of such air over the area. Sixty percent of all types occur in the afternoon. *Subject Headings:* **Thunderstorms, U.S.S.R.**—*M.R.*

H–66 551.511

Bjerknes, J., **Saturated-adiabatic ascent of air through a dry adiabatically descending environment.** *Royal Meteorological Society, Quarterly Journal*, 64:325–330, **1938.** 2 figs., 13 equations. **DLC**—Theoretical treatment given of the cumulus convection in an atmosphere with a temperature lapse rate between the saturated-adiabatic and the dry-adiabatic (conditional instability). Result is that the cumulus convection does not convert heat into kinetic energy unless the ratio between the width of the cumulus towers and that of the cloudless intervals is below a certain critical value. *Subject Headings:* **Convection, Cumulus clouds.**—*From author's summary.*

H–67 551.515.4:551.594.6 550.37

Bose, S. S. and Mahalanobis, P. C., **On an exact test of association between the occurrence of thunderstorm and an abnormal ionisation.** *Indian Journal of Statistics, Sankhyā*, 3:249–252, **1938.** 7 tables, 5 refs., equations. **DLC**—Refers to work by Bhar and Syam, 1937, and gives opinion on the existence of any statistical association between the occurrence of thunderstorms and the ionization of the Kennelly-Heaviside layer near Calcutta. *Subject Headings:* **Thunderstorms, Ionosphere, Calcutta, India.**

H–68 551.515.4:551.594.6

Bureau, Robert, **Centres of thunderstorms and "centres" of sources of atmospherics.** *Royal Meteorological Society, Quarterly Journal*, 64:331–335, **1938.** 3 figs., 2 refs. **DLC**—Author feels that a fairly reliable relationship exists. *Subject Headings:* **Thunderstorms, Sferics.**

H–69 551.515.4(54):551.506.7

*Chatterjee, G. and Sur, N. K., **Discussion of results of soundings of temperature and humidity at Jhikargacha (Bengal) in April and May 1929.** *India, Meteorological Dept., Meteorological Memoirs*, 26:165–187, **1938.** 20 figs., numerous tables, 7 refs. **DWB**—Temperature and humidity up to 2.5 km. are discussed in relation to latent instability and the occurrence of thunderstorms. *Subject Headings:* **Thunderstorm dynamics, Bengal, India.**

H–70 551.515.4:551.590.21

Hrudička, Boh., **Zur Säkulärperiode der Gewitterhäufigkeit.** [The secular period of thunderstorm frequency.] *Meteorologische Zeitschrift*, 55:264–265, **1938.** fig., refs. **DWB**—Author finds some agreement (using long series for Prague) with Hamberg's, Piron's, and Myrbach's, but not with Brooks', equations. *Subject Headings:* **Thunderstorms, Sunspots.**

H–71 551.515.4(51)

Lu, A., **The distribution of the number of thunderstorms in eastern China.** *Meteorological Magazine, Nanking*, 14:146–151, **1938.** fig., tables. In Chinese. English summary p. 146. **DLC**—Thunderstorm distribution and frequency, time of day and year, taken up. Percentages of rainfall due to thunderstorms tabulated. *Subject Headings:* **Thunderstorms, Thunderstorm rainfall, China.**

H–72 551.515.4(51)

Lu, A., **The spring thunderstorms of the Szechwan basin.** *Meteorological Magazine, Nanking*, 14:219–226, **1938.** 4 figs., tables. In Chinese. English abstract p. 219–220. **DLC**—Meteorological conditions accompanying these storms briefly analyzed: temperature, humidity, pressure, air mass characteristics, instability, etc. Place of origination and direction of movement discussed briefly. *Subject Headings:* **Thunderstorms, Szechwan Basin, China.**

H–73 551.515.4(54)

Mal, S. and Desai, B. N., **The mechanism of thundery conditions at Karachi.** *Royal Meteorological Society, Quarterly Journal*, 64:525–537, **1938.** 5 figs., table, 6 refs. **DLC**—Weather conditions and aeroplane ascents at Karachi between June 22 and July 2, 1936, have been examined for understanding the mechanism of thundery conditions which prevailed there during that period. It is observed that thundery conditions occurred when the characteristic monsoon inversion was absent and there was a sufficiently deep layer of air which, when raised to a certain level either by insolation, arrival of sea air, or convergence of winds, released an appreciable amount of energy of latent instability. *Subject Headings:* **Thunderstorm dynamics, Karachi, India.**—*Author's abstract.*

H–74 551.515.4:551.509

Namias, Jerome, **Thunderstorm forecasting with the aid of isentropic charts.** *American Meteorological Society, Bulletin*, 19:1–14, **1938.** 9 figs., 7 refs., equations, **DWB**—Author believes

after a careful study of upper air data for the summer of 1937, that a more complete picture of convective thunderstorms can be obtained by an isentropic analysis of flow patterns in the free atmosphere. He hopes that such a method may enable more accurate forecasting of convective summer thunderstorms. *Subject Headings:* **Thunderstorm forecasting, Upper air winds.**

H–75 551.511

Normand, Charles W. B., **On instability from water vapour.** *Royal Meteorological Society, Quarterly Journal*, 64:47–69, **1938.** 9 figs., 12 refs. Discussion. **DWB**—This paper summarises the general criteria for the stability of a particle and of a layer in the atmosphere under conditions when condensation may bring the latent heat of water vapour into play. Discusses briefly relationship between "Feucht-Labilität" (Refsdal), latent instability (Normand), and convective instability (Rossby). Conditions for latent instability are defined with the aid of the tephigram. Reply to the discussion on his paper. *Ibid.*, 64:338–340, **1938.** *Subject Headings:* **Instability, Water vapor.**— *Author's abstract.*

H–76 551.515.4

Schwerdtfeger, W. and Schütze, R., **Wetterflug in einem Wärmegewitter.** [Weather flight into a heat thunderstorm.] *Zeitschrift für angewandte Meteorologie*, 55:137–142, **1938.** 2 figs. **MH-BH**—Warm air parcel in cumulonimbus. Investigation of dynamics of thunderstorms by plane flights into them. Upper air conditions discussed, strong vertical currents (estimated at 17 m./s.) with graphs of temperature, pressure and humidity. *Subject Heading:* **Thunderstorm dynamics.**

H–77 551.511:551.515.4

Suckstorff, G. A., **Kaltlufterzeugung durch Niederschlag.** [Generation of cold air by precipitation.] *Meteorologische Zeitschrift*, 55:287–292, **1938.** 7 figs., 5 refs. **DWB**—The cooling that occurs in the precipitation regions of rainshowers, thunderstorms, and cold fronts depends on three principles: (1) cooling by moist adiabatic fall of air in the precipitation region; (2) melting of falling snow and hail; (3) cooling of the ground by cooling products of precipitation and their partial evaporation. In thunderstorms cooling occurs mainly on the grounds of (2) and (3). Through this "separate generation of cold air" individual thunderstorms maintain frontal characteristics, and cold fronts will be strengthened in the immediate vicinity. *Subject Headings:* **Thermodynamics of the atmosphere, Thunderstorm dynamics.**

H–78 551.594.21:551.594.221

†Wichmann, Heinz, **Über die Bedeutung des Blitzes im elektrischen Mechanismus des Gewitters.** [On the importance of lightning in the electrical mechanism of thunderstorms.] *Deutsche Seewarte, Archiv*, 58, No. 10, Hamburg, **1938.** 21 p. 26 refs. **DWB**—Three measurements of the electrostatic field of the earth taken by different instruments by Wilson's method are compared. Causes of lightning are studied and an attempt made to integrate the results into a general picture of the electric processes in thunderclouds. *Subject Headings:* **Thunderstorm electricity, Lightning.**

H–79 551.515.4:551.557(436)

Winter, H., **Sommerliche Westlufteinbrüche und Gewitterhäufigkeit.** [Summer intrusions of westerly winds and thunderstorm formation.] *Meteorologische Zeitschrift*, 55:91–97, **1938.** 6 figs., 3 tables, 8 refs. **MH-BH**—Study of westerly winds in summer in the northern Alps of Austria in relation to thunderstorm phenomena from 1926 to 1935. A correlation for forecasting is worked out. *Subject Headings:* **Thunderstorm forecasting, Alps, Austria.**

H–80 551.515.4(51)

§Woo, S. C., **The thunderstorms of China.** *Meteorological Magazine, Nanking*, 14:131–145, **1938.** figs., tables. In Chinese. English summary p. 131. **DLC**—Thunderstorms classified into two classes, heat and frontal; each type is illustrated. The thermal structure and weather conditions which cause development of thunderstorms and the geographical and monthly distribution of thunderstorms are discussed and tabulated. *Subject Headings:* **Thunderstorms, China.**

H–81 551.515.4:551.509.317(52)

Arakawa, H., **Thunderstorm forecasting with the aid of charts representing the topography of condensation level.** *Meteorological Society of Japan, Journal, 2 Ser.*, 17(3):101–103, **1939.** 4 figs. In Japanese. English summary p. (10)–(11). **DWB**—Series of maps representing topography of condensation level in space and time during Aug. 1938, constructed from surface observations at over 70 stations. Not conclusive. *Subject Headings:* **Thunderstorm forecasting, Japan.**

H–82 551.594.21

Chapman, F. W., **Atmospheric disturbances due to thundercloud discharges I.** *Physical Society of London, Proceedings*, 51:876–894, 1939. 10 figs., 16 refs., 3 equations. **DLC**—Various ways of delineating photographically the random transient changes in the earth's electric field by means of a cathode ray oscillograph are described together with a convenient method of recording the time history of all the disturbances that arise from a thundercloud discharge. Results obtained from interpretations of records give the magnitude and nature of the currents involved in the various stages of the flash. *Subject Heading:* **Thunderstorm electricity.**—*From author's abstract.*

H–83 551.515.4

†Kolobkov, N. V., **Grozy i shkvaly.** [Thunderstorms and squalls.] Moscow, Hydrometeorological Office, 1939. 220 p. 90 figs., 39 tables, 68 refs., equations. **DWB, DLC**—Translation by Alexander G. Alexeeff, available. Basic contribution to the subject in Russian. Author considers the problem of thunderstorms and squalls from a practical point of view (taking account of the requirements of the military and the civil meteorological services) as well as the more complicated theoretical problems. Sources of material for the book are aerological soundings and daily weather records of the Civil Aeronautic Meteorological Stations of the Red Army; special observations of the Mikhnevskaya Meteorological Station, 1923–1932; studies made by the Meteorological Laboratory of Zvenigorod, 1932–1936; and Russian and foreign literature. A thorough, comprehensive study. *Subject Headings:* **Thunderstorms, Squalls, U.S.S.R.**

H–84 551.456.1 551.515.4(492)

Lohuizen, H. P. T. van, **Wind- en onweersverschijnselen op 5 Augustus 1938.** [Wind and thunderstorm phenomena Aug. 5, 1938.] *Hemel en Dampkring*, 37:147–154, **1939.** Unchecked. *Subject Headings:* **Thunderstorms, Netherlands.**

H–85 551.515.4(52)

*Ogasahara, Kazuo, **On the mechanism of formation of summer squalls in the southwest plain region of Formosa for the synoptic meteorologist.** Society of Tropical Agriculture, *Taihoku Imperial Univ., Formosa, Journal*, 11(1):15–56, **1939.** 3 figs., 5 tables. **DWB**—Author attempts to find correlation of wind direction at Pratus, Ishigaki, and Shanghai with precipitation in various parts of Formosa during April to September and thereby discusses mechanisms of summer squall formation. "Three point observation method" presented. *Subject Headings:* **Squalls, Thunderstorm dynamics, Formosa.**

H–86 551.511:551.558.1

Petterssen, Sverre. **Contribution to the theory of convection.** *Geofysiske Publikasjoner*, 12, No. 9, **1939.** 23 p. 13 figs., table, refs., 18 equations. **DLC**—A systematic presentation of the theoretical aspects of convection, using first the parcel method and then the slice method. Various conditions leading to convective activity are analyzed and discussed. Available and released energy, convective currents and cumulus formation are considered, with schematic diagrams illustrating the respective models. An attempt is made to set a limit on the lateral dimensions of thunderstorms, but not enough observational material is available. *Subject Heading:* **Convection.**—*M.R.*

H–87 551.515.4

Suckstorff, G. A., **Die Ergebnisse der Untersuchungen an tropischen Gewittern und einigen anderen tropischen Wettererscheinungen.** [Results of research on tropical thunderstorms and several other tropical weather phenomena.] *Beiträge zur Geophysik*, 55:138–185, **1939.** 33 figs., 2 tables, 8 refs. **DLC**—Methods and instruments discussed. Tropical and European thunderstorms compared in regards to temperature, pressure, and wind systems. Effects of monsoon and trade winds on meteorological conditions. Air pressure records from different parts of Atlantic. Results of dew point measurements. *Subject Headings:* **Thunderstorms, Tropics, Europe.**

H–88 551.515.4

Utuki, M. and Takahasi, K., **On the conditions necessary for the occurrence of the heat thunderstorm.** *Meteorological Society of Japan, Journal, 2 Ser.*, 17:404–405, **1939.** 2 figs. In Japanese. English summary p. 38. **DWB**—Occurrence of heat thunderstorm by breaking of the conditional instability of the atmosphere. Necessary conditions investigated by means of aerological data in Japan, and their validity confirmed. Brief article. *Subject Headings:* **Thunderstorms, Japan.**

H–89 551.515.4(494)

†Weixlederer, Rudolf, **Studien über die alpine Gewittertätigkeit.** [Studies in alpine thunderstorm activity.] *Meteorologische Zeitschrift*, 56:215–226, **1939.** 11 figs., 3 tables, 17 refs. **MH-BH**

—Statistical research conducted from stations in the Alps on thunderstorm formation, frequency and dissipation, and on daily movements. *Subject Headings:* **Thunderstorms, Alps.**

H–90 551.515.4:550.3

Yosimatu, T., **Thunderstorms and the earth's magnetism.** *Meteorological Society of Japan Journal, 2nd Ser.*, 17:37+, **1939.** 3 figs., 3 tables, 5 refs., equations. In Japanese. English summary p. (2) (3). **DWB**—Statistical investigation to find slow or stationary variations in the earth's magnetism due to thunderstorms (mainly heat thunderstorms) near Kakiota Magnetic Observatory in summers. Results listed. *Subject Headings:* **Thunderstorms, Terrestrial magnetism, Japan.**

1940–1942

H–91 551.515.4(54)

Basu, S. and Sahay, Ram, **Synoptic and aerological study of a thunderstorm at Agra, Dec. 3rd 1936.** *India, Meteorological Dept., Scientific Notes*, 8, No. 89:67–75, **1940.** **DWB**—Abstract *Science Abstracts*, No. 1215, July **1941.** Unchecked in original. *Subject Headings:* **Thunderstorms Agra, India.**

H–92 551.594.21:551.578.4

Findeisen, W., **Über die Entstehung der Gewitterelektrizität.** [On the formation of thunderstorm electricity.] *Meteorologische Zeitschrift*, 57:201–215, June **1940.** 10 figs., 9 refs., 8 equations. **DWB**—Relation of thunderstorm electricity to ice particle developments in cumulonimbus. *Subject Headings:* **Thunderstorm electricity, Ice crystal formation.**

H–93 551.515.4 551.594.21 551.576

Kähler, Karl F., **Wolken und Gewitter.** [Clouds and thunderstorms.] Leipzig, J. A. Barth **1940.** 158 p. 26 figs., 13 tables, refs., equations. **DLC**—Section C presents a general discussion of thunderstorm dynamics: meteorological processes of "warm," or local, and frontal types of thunderstorms, and consideration of cloud physics. A comprehensive discussion of thunderstorm electrical phenomena follows. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm electricity, Cloud physics.**

H–94 551.515.41

†*Koschmieder, Harald, **Über Böen.** [On squalls.] *Reichsamt für Wetterdienst, Wissenschaftliche Abhandlungen*, 8, No. 3, Berlin, 1940. 54 p. 50 figs., 6 tables, 43 refs. **DLC**—A thorough empirical study of the dynamics and kinematics of thundersqualls, line squalls, and dust storms, based on analysis of 27 actual cases. Surface records made at Potsdam and aerological observations made at Lindenberg are presented graphically for most cases and supplemented by eye observations, synoptic conditions and analysis of surface and aerological data. Three types of statistical summaries are presented for the 27 cases: kinematic, aerological and dynamic. Rules are derived for forecasting 6 types of squalls. Part II consists of a comprehensive review of various theories and models of thunderstorms and squalls from the earliest times to World War II. A section is devoted to the kinematics of heat thunderstorms; and another, to dry line squalls. Included are photographs of such storms and squalls and numerous adiabatic charts and anemograph records. *Subject Headings:* **Thunderstorm dynamics, Squalls.**—*M.R.*

H–95 551.515.4(492) 551.594.11

†*Kuyper, D., **Onweersfrequentie in Nederland 1907–1936. Metingen van het luchtelectrisch potentiaalverval.** [Frequencies of thunderstorms in the Netherland 1909–1936. Measurements of the atmospheric electric potential gradient.] *Netherlands, Mededeelingen en Verhandelingen*, No. 44, **1940.** 134 p. 16 figs., 28 tables, 82 refs. Abstract in English, p. 131–134. **DLC**—Extensive statistical report. Frequency and geographical distribution by year, season and month determined and tabulated. Discussion of why Holland has highest thunderstorm frequency in western Europe. Horizontal dimensions of thunderstorms in different months and seasons examined. Recordings of potential gradient and variations discussed. *Subject Headings:* **Thunderstorms, Potential gradient, Netherlands.**

H–96 551.515.4:551.509

Namias, Jerome, **Synoptic aspects of the thunderstorm.** (In his **An introduction to the study of air mass and isentropic analysis.** Fifth rev. and enl. ed. Milton, Mass., American Meteorological Society, Oct. **1940.** p. 60–69.) **MH-BH**—Author presents briefly the probable causes of various types of thunderstorms according to physical factors, and indicates the use of aerological data in their analysis and forecasting. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm forecasting.**

H–97 551.515.4(52)

Narimatu, A. and Sigeta, Z., **On the periodicity of thunderstorms.** *Meteorological Society of Japan, Journal, 2 Ser.*, 18:239–241, **1940.** 5 figs., 3 refs. In Japanese, English summary, p. (26). **DWB**—Periodicity of thunderstorms determined by means of periodogram method using data from 1933–1938 in Japan. *Subject Headings:* **Thunderstorms, Japan.**

H–98 551.515.4(471.1)

†*Oksanen, Kaino W., **Karten über die Gewittertage.** [Charts showing thunderstorm days.] *Finland, Ilmatieteellisen Keskulaitoksen, toimituksia*, No. 21, **1940.** 24 p. 9 maps, tables, 19 refs. **DWB**—Geographical distribution of thunderstorm days in Finland, 1887–1936. Table shows the mean number of days for each station by month, and year. Nine maps of Finland show mean number of days for the seasons, and for each of the years, 1908–1917. *Subject Headings:* **Thunderstorms, Finland.**

H–99 551.515.4:551.511(471.1)

†*§Rossi, V., **Aerologische Untersuchungen über die Feuchtlabilität der Luft in Finnland besonders in Gewitter- und Schauerwetterlagen.** [Aerological investigations on moist instability of air in Finland especially in thunderstorm and shower conditions.] *Helsinki Universität, Meteorologisches Institut, Mitteilungen*, No. 44, **1940.** 110 p., 45 figs., 41 tables, 68 refs., equations. **DWB**—A thorough synoptic aerological analysis using observational data from Utti, Finland, for 1932–1936. Thunderstorm frequency and variations related to air mass conditions, seasons, etc. *Subject Headings:* **Thunderstorms, Instability, Synoptic-aerological studies, Finland.**

H–100 551.515.4(42):551.577.37

Tinn, Arnold B., **Local distribution of thunder rains round Nottingham.** *Royal Meteorological Society, Quarterly Journal*, 66:47–65, **1940.** 12 figs., 3 tables, 2 refs. **DLC**—Investigation made to determine relation between paths of thunderstorms and the valley of the River Trent and to discover whether any tendency does exist in the local distribution of thunder rains round Nottingham. Information obtained from 34 rain gages over ten years; data charted; conclusions drawn. *Subject Headings:* **Thunderstorm rainfall, Nottingham, England.**

H–101 551.515.4(45)

Bossolasco, Mario, **Distribuzione e frequenza dei temporali nell' Italia settentrionale.** [Distribution and frequency of thunderstorms in northern Italy.] *Geofisica Pura e Applicata*, 3(2):71–85, **1941.** 2 figs., 11 refs. **DLC**—Based on observations of thunderstorms at some 200 stations in northern Italy 1875–1935, a chart showing their mean annual frequency has been drawn. Remarks on yearly and secular variation. *Subject Headings:* **Thunderstorms, Italy.**

H–102 551.515.4

§Harrison, H. T. and Orendorff, W. K., **Pre-coldfrontal squall lines.** *United Airlines, Meteorology Dept., Circular*, No. 16, **1941.** 12 p. 3 figs., 2 tables. **DWB**—Detailed study is made of all factors of all squall lines occurring along the Cheyenne–New York airway, April 1939 to May 1940. Synoptic analysis given of particular pre-frontal thunderstorm line squalls. Finally forecasting of squall lines is taken up along with probabilities of tornado and hail occurrence. *Subject Headings:* **Thunderstorms, Line squalls, Synoptic studies.**

H–103 551.515.4

Kaster, H. B., **Thunderstorms.** *United Airlines, Meteorology Dept., Circular*, No. 17, April **1941.** 11 p. **DWB**—A summary is given of practical conclusions gathered from previous United Airlines circulars on thunderstorms. Characteristics common to all thunderstorms are outlined separately such as periodicity, structure, air mass conditions, hail, lightning, turbulence and squall wind. Specific thunderstorm types are discussed individually including: convection, orographic, warm front, stationary front, nocturnal, cold front (or line squall) and pre-coldfrontal line squall types and tornadoes. A section takes up forecasting of thunderstorms using pseudoadiabatic charts, lapse rate, dew point, level of free convection, etc. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm forecasting.**

H–104 551.515.4

Levin, Gerald, **Thunderstorm mechanics.** Calif., Institute of Technology, Pasadena, **1941.** 41 p. figs., tables, 8 refs., equations. (Thesis. Mimeographed.) **DWB**—Computation of correct magnitude for maximum and minimum velocities in a thunderstorm; how streamlines of precipitation and velocity are concentrated in a thunderstorm when moving and when stationary; theory as to production of large electrical charge in thundercloud necessary to produce observed electrical phenomena; maximum size of raindrops and hailstones; possibility of computing height that thunder-

cloud rises above maximum velocity level by equating kinetic energy to potential energy and pertinent use of adiabatic charts; physical factors causing cold outflow of air preceding thunderstorms. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm electricity.**

H–105 551.515.

Minser, E. J., **Thunderstorms.** *Transcontinental and Western Air, Inc., Meteorological Dept. Technical Note,* No. 3, Kansas City, Mo., **1941.** 8 p. (Mimeographed.) **DWB**—Air mass characteristics for thunderstorms reviewed. Definitions given of various types of thunderstorms: cold front, prefrontal, convective, air mass, orographic, radiational (high level), isentropic, and tropical thunderstorms. *Subject Heading:* **Thunderstorms.**

H–106 551.515.4:551.51

Neiburger, M., **Vorticity analysis of a thunderstorm situation.** *American Meteorological Society, Bulletin,* 22:1–5, **1941.** 5 figs., 2 refs., equation. **DWB**—Author says: 1) the potential vorticity distribution is considerably affected by vertical mixing; 2) nevertheless the changes thus introduced are of a simple nature and are consistent with the principle of conservation of potential vorticity. *Subject Headings:* **Thunderstorms, Vorticity.**

H–107 551.515.4:551.55

Shipley, J. F., **The air currents in a lightning storm.** *Royal Meteorological Society, Quarterly Journal,* 67:340–345, Oct. **1941.** fig. **DLC**—Principles of the heat thunderstorm simply explained: cellular activity, turbulence, etc.; as well as brief mention of mechanical processes of cold and warm fronts. *Subject Heading:* **Thunderstorms.**

H–108 551.594.2

Simpson, George C. and Robinson, G. D., **The distribution of electricity in thunderclouds. II.** *Royal Society of London, Proceedings, Ser. A,* 177:281–329, **1941.** 15 figs., 4 tables, 4 refs. **DWB**—Continuation of Simpson and Scrase work of 1937. The generation of the upper positive and lower negative charges in the main body of the cloud is ascribed to the impact of ice crystals and that of the positive electricity at the base of the cloud to breaking of raindrops in an ascending current of air. *Subject Heading:* **Thunderstorm electricity.**

H–109 551.515.4:551.509.3(481)

*Spinnangr, Finn and Hjorth, Harald, **On thunderstorm forecasting in western Norway.** *Bergens Museums Årbok,* 1941. *Naturvitenskapelig rekke,* No. 9. 38 p. **MH-BH**—Abstract in *American Meteorological Society, Bulletin,* 27:36, Jan. **1946.** **DWB**—Thunderstorms over 5-year period examined from synoptic-aerological point of view to obtain forecasting rules. Source regions and trajectories of air masses determined. Heat content, moisture distribution, and stability conditions of masses estimated. Direct and indirect aerological methods used. Difficulty of finding usable forecasting rules stressed. *Subject Headings:* **Thunderstorm forecasting, Norway.**

1942

H–110 551.515.4

Brancato, G. N., **Meteorological behavior and characteristics of thunderstorms.** U. S. Weather Bureau, Hydrometeorological Section, April **1942.** 14 p. 8 figs., 5 refs., equations. **MH-BH, DLC**—Also in *Aviation,* 41:101–103, Oct.–Nov. **1942,** and reprinted by Dept. of Transport, Air Services Branch, Canada. Hydrometeorological investigation of thunderstorm rainfall made with respect to flood conditions caused by thunderstorms. Conclusions drawn concerning duration, movement relative to gradient winds, circulation pattern and energy expended. Suggestions to pilots given. *Subject Headings:* **Thunderstorm dynamics, Aviation.**

H–111 551.515.4:629.13

Browne, J. A., **Thunderstorm characteristics and flight procedures.** *Transcontinental and Western Air, Inc., Meteorological Dept. Technical Note,* No. 5, Kansas City, Mo., July 20, **1942.** 19 p. (Mimeographed.) **MH-BH**—Also *U. S. Civil Aeronautics Board, Safety Bulletin,* No. 154. Washington, D. C., **1942.** 23 p. 4 figs. **DWB**—Thunderstorm structure described; flying hazards and procedures, squall winds. Stability and instability discussed; thunderstorm types listed and respective flight procedures given. *Subject Headings:* **Thunderstorms, Aviation.**

H–112 551.515.4(771)

§Byers, Horace R., **Non-frontal thunderstorms.** *University of Chicago, Institute of Meteorology, Miscellaneous Reports,* No. 3, **1942.** 26 p. 15 figs., 11 refs., equations. **MH-BH**—Abstract in *American Meteorological Society, Bulletin,* 22:295, **1941.** Report of detailed study of structure of

non-frontal thunderstorms using data from the micrometeorological network of stations over the Muskingum watershed in Ohio. Storms studied occurred June 16, 1937. Thermodynamics, effects of evaporation, and potential and kinetic energy in relation to convection cells are considered. *Subject Headings:* **Thunderstorm dynamics, Ohio.**

H–113 551.594.21 551.594.221

Israël, Hans, **Die elektrischen Erscheinungen des Gewitters.** [Electrical phenomena of thunderstorms.] *Germany, Reichsamt für Wetterdienst, wissenschaftliche Abhandlungen*, 8, No. 4, Berlin, 1942. 44 p. 56 figs., 4 plates, tables, refs., equations. **DWB**—Detailed, theoretical work, graphically illustrated. *Subject Headings:* **Thunderstorm electricity, Lightning.**

H–114 551.515.4:551.558.1:551.543

Levine, J., **The effect of vertical accelerations on pressure during thunderstorms.** *American Meteorological Society, Bulletin*, 23:52–61, Feb. 1942. 2 figs., 3 tables, 9 refs., 15 equations. **DWB**—Pressure variations accompanying a thunderstorm are theoretically investigated. Vertical acceleration effects are computed. Three methods are used and compared to show that the symmetrical hump, usually made in the barogram during a thunderstorm, is due to vertical accelerations. A model of thunderstorm circulation is constructed. *Subject Headings:* **Thunderstorms, Vertical velocities, Pressure variations.**

H–115 551.515.4:551.509

Orkin, Andrew W., **Thunderstorms, their causes and aids in forecasting.** California, Institute of Technology, Pasadena, 1942. 10 p. figs., 17 refs. (Mimeographed.) **DWB**—Thunderstorms classified as to causes. Thermodynamic possibilities given for development of cumulus clouds or thunderstorms. Procedures listed for forecasting possible thunderstorms. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm forecasting.**

H–116 551.515.4

Serra, Adalberto, **A formaçao das trovoadas.** [The formation of thunderstorms.] Rio de Janeiro, Serviço de Meteorologia, 1942. 17 p. 27 p. charts, 11 p. English translation. **MH-BH**—General discussion of conditions favoring occurrence of thunderstorms in different air masses and at various kinds of fronts during warmer half year. A series of particular cases is described with the aid of surface and upper level charts and tephigrams. Conclusions drawn. *Subject Heading:* **Thunderstorm dynamics.**

H–117 551.515.4(481)

Spinnangr, Gunnar, **On local summershowers in south-eastern Norway.** *Meteorologiske Annaler*, 1(8):149–206, 1942. **MH-BH**—Abstract, *American Meteorological Society, Bulletin*, 27:36–37, Jan. 1946. **DWB**—Continental tropical air has great resemblance to continental polar air and enters southeastern Norway with great instability aloft. The lower layers, thereby, are stable, and often several days may pass before a stronger convection takes place. The different situations with continental tropical air may have various contents of relative humidity aloft, but often this humidity is great, and in such situations showers are always accompanied by thunderstorms. The showers as a rule are of local character; it is difficult to predict showers for marked areas. *Subject Headings:* **Thunderstorms, Norway.**—*From author's summary.*

H–118 551.515.4:551.521.32

Villa, Eduardo, **Instabilità perradiazione notturna.** [Instability from nocturnal radiation.] *Rivista di Meteorologia Aeronautica*, 6(1):15–19, 1942. 4 figs., equations. **DLC**—Development of air mass thunderstorms (far from frontal activity) at night discussed in theory and illustrated by means of soundings (up to 5 km.) for three consecutive days, where thunderstorms occurred during the second and third nights. *Subject Headings:* **Thunderstorm dynamics, Instability, Thunderstorm forecasting, Radiation.**—*M.R.*

H–119 551.594.21

*Workman, E. J., Holzer, R. E., and Pelsor, G. T., **The electrical structure of thunderstorms.** *U. S. National Advisory Committee for Aeronautics, Technical Note*, No. 864, Nov. 1942. 47 p. 15 figs., 6 tables, 7 refs., equations. **DLC**—The time histories of thunderstorm charge distribution during three storms occurring during the summer of 1940 in the vicinity of Albuquerque airport were investigated by the use of eight synchronized recording electrometers arranged in a particular pattern over a field 1.6 km. above sea level. Horizontal and vertical cross sectional diagrams are presented to show the instantaneous midinterval positions, the signs and the magnitudes of all charges involved in strokes during specified uniform time intervals. *Subject Heading:* **Thunderstorm electricity.**—*From author's abstract.*

1943–1944

H–120 551.515.4:629.13

Buck, Robert N., **Thunderstorms.** *Air Facts*, 6(10):27–37, Oct. **1943**; (11):30–35, Nov., and (12):20 26, Dec. **1943.** **DLC**—Three popular style articles on thunderstorms and how to fly through them. *Subject Headings:* **Thunderstorms, Aviation.**

H–121 551.515.4:551.558.1

Buell, C. E., **The determination of vertical velocities in thunderstorms.** *American Meteorological Society, Bulletin*, 24:94–95, March **1943.** 2 tables, 2 refs., equations. **DWB**—Brief theoretical article gives equation to determine maximum vertical velocities in thunderheads with additional variables for developing cumulus. Table set up giving the maximum vertical velocity as a function of the height of the "jump" in the barograph trace. *Subject Headings:* **Thunderstorms, Vertical velocities.**

H–122 551.515.4:551.594.6:551.501.81

Forrest, J. S., **The determination of the location and frequency of thunderstorms by a radio method.** *Royal Meteorological Society, Quarterly Journal*, 69:33–46, Jan. **1943.** 9 figs., 2 tables. 9 refs. **DLC**—Method described of continuously recording atmospherics in order to obtain warning of the outbreak of a thunderstorm and to determine the distance of the storm from the recording site. Results of three years' experience with this technique are given. By correlating the output recorder deflections with the known locations of electric power system breakdowns due to lightning, the relation between the recorder output and the storm distance has been determined. Statistical information on the frequency of thunderstorms and details of diurnal variations in the intensity of atmospherics in the south of England, given. *Subject Headings:* **Thunderstorms, Sferics, Radar storm detection, England.**—*From author's abstract.*

H–123 551.515.4(54)

Gupta, Prabhat Kumar Sen, **Kalbaishakhis (thundersqualls) of Bengal.** *American Meteorological Society, Bulletin*, 24:96–102, March **1943.** 9 figs., table, 11 refs. Summary in Spanish p. 120. **DWB**—Analysis made of factors involved in the production of a Kalbaishakhi: instability, unevenness of the surface and density of the cold wedge, causing unequal lifting of moist air, etc. *Subject Headings:* **Thunderstorm dynamics, Bengal, India.**

H–124 551.515.4:551.578.1(789)

Harrold, L. L., **Thunderstorms and runoff at high elevations in northwestern New Mexico.** *American Geophysical Union, Transactions*, 24:425–438, **1943.** 12 figs., table, 3 refs. **DLC**—Detailed examples of rainfall data for smaller areas and data on the resulting runoff from the watersheds of the Navajo Conservation Experiment Station, northwestern New Mexico. *Subject Headings:* **Thunderstorm rainfall, New Mexico.**

H–125 551.515.4:551.511

Kaplan, Henry G., **On the mechanism of thunderstorm downdrafts.** *American Meteorological Society, Bulletin*, 24:54–59, Feb. **1943.** fig., 5 refs. **DWB**—The cooling processes that maintain a downdraft in a thunderstorm are divided into several factors. Most important is heat of vaporization of the heavy precipitation falling with or through the descending units; another is the specific heat of the quantities of water and ice accompanying or passing through each unit of descending air; another is the melting of ice hydrometeors; etc. Further characteristics of downdraft mechanics also noted. *Subject Headings:* **Thunderstorm dynamics, Vertical currents.**

H–126 551.594.21

Lueder, H., **Elektrische Registrierung von heranziehenden Gewittern und die Feinstruktur des luftelektrischen Gewitterfeldes.** [Electrical records during approaching thunderstorms and the microstructure of the electric field of thunderstorms.] *Meteorologische Zeitschrift*, 60:340–351, **1943.** 12 figs., 10 refs. **DWB**—Well-illustrated work. *Subject Heading:* **Thunderstorm electricity.**

H–127 551.515.4

Malurkar, S. L., **Dynamics of thunderstorms.** *Indian Academy of Science, Proceedings, A*, 18(1):20–27, July **1943.** refs., 11 equations. (Photostat.) **DWB**—Theoretical paper analyzing thunderstorm dynamics. Initial convection in thunderstorm development is considered due, not to an anomalous potential density distribution, but rather to surfaces of equal temperature or humidity not being horizontal, to wind velocity gradients, and to other causes. Convection is maintained by a regenerative process in which the momentum of an upward current of relatively dry air causes it to overshoot its hydrostatic equilibrium level and to condense much higher up, the latent heat released continuing the process. *Subject Headings:* **Thunderstorm dynamics, Convection.**

H–128 551.594.21

Rudolph, H., **Der elektrische Mechanismus des Gewitters.** [The electric mechanism of a thunderstorm.] *Meteorologische Zeitschrift*, 60:355–356, **1943.** 5 refs. **DLC**—Brief note reviewing some of work in thunderstorm electricity. The ionosphere affects the extended cloud cover whose ice crystals have a high potential. After the lightning discharge, the negative ions pass through the earth towards the region of the polar auroras, where they penetrate the atmosphere, etc. *Subject Heading:* **Thunderstorm electricity.**

H–129 551.515.4(262)

Shideler, David and Means, Lynn L., **Thunderstorms in the Mediterranean area.** (In **A report of synoptic conditions in the Mediterranean area.** University of Chicago, Institute of Meteorology, **1943.** p. 134–138. 3 refs.) **DWB**—Brief descriptions of thunderstorm activity in the principle regions of the Mediterranean: frequency, periodicity, distribution, etc. *Subject Headings:* **Thunderstorms, Mediterranean Region.**

H–130 551.515.4 551.594.21

†*Stekol'nikov, I. S., **Fizika molnii i grozozashchita.** [Physics of lightning and thunderstorm protection.] Moscow, Izdat. Akademii Nauk, S.S.S.R., **1943.** 230 p. 179 figs., 21 tables, 27 refs. **DLC**—Highly technical, well-illustrated book summarizing the basic work performed in this field by the author and others in Russia and abroad, 1939–1943. Thunderstorm formation, distribution, and electricity are first taken up; then follow systematically arranged chapters with numerous photographs, schematic diagrams and data on instrumentation, methods of observation, results of research, mechanism of lightning formation, methods of protection of structures, transmission lines, aircraft, etc. Fold-in charts show detailed distribution of thunderstorms in the Caucasus and vicinity and for the whole Soviet Union. *Subject Headings:* **Thunderstorms, Lightning, U.S.S.R.**—*M.R.*

H–131 551.515.4

U. S. Air Weather Service, **Thunderstorms.** Washington, D. C., *Weather Information Branch, Report*, No. 632, **1943.** 15 p. 3 refs. **DWB**—This paper combines practical conclusions from previous circulars of U. S. Air Force on various phases of the thunderstorm problem. Condensed discussions are included of characteristics common to all thunderstorms. *Subject Heading:* **Thunderstorms.**

H–132 551.515.4(773)(776)

Clayton, John, **Analysis of thunderstorms at Chicago, Illinois.** University of Chicago, Dec. **1944.** 24 p. 12 figs., tables. **DWB**—Climatological study; classification of storms for year 1943 according to synoptic and causal factors; conclusions. Also, **Analysis of thunderstorms at Joliet, Ill.** University of Chicago, **1945.** 8 p. tables, ref. And, **Analysis of thunderstorms at Minneapolis, Minnesota.** University of Chicago, **1945.** 7 p. 3 tables. **DWB**—*Subject Headings:* **Thunderstorms, Illinois, Minnesota.**

H–133 551.515.4:551.576

Coulomb, J. and Sourdillon, M., **Nuages coiffant la montagne d'air froid formée sous un orage.** [Clouds covering a mountain of cold air formed under a thunderstorm.] *Annales de Géophysique*, 1:92–95, **1944.** Unchecked. *Subject Headings:* **Thunderstorm dynamics, Clouds.**

H–134 551.515.4(78)

Crowley, D. M., **Causes of night-time thunderstorms over the Middle West.** *Transcontinental and Western Air, Inc., Meteorological Dept., Technical Note*, No. 8, Kansas City, Mo., Jan. **1944.** 20 p. 19 figs., 3 tables. **MH-BH**—Discussion of thunderstorm which is initiated and maintained by instability. An analysis is made of the development of the low pressure trough along the eastern slope of the Rocky Mts. Conditions initiating nighttime thunderstorms listed, and typical occasions when these conditions prevailed and produced thunderstorms described. *Subject Headings:* **Thunderstorms, Great Plains.**—*From author's abstract.*

H–135 551.515.4(914)

Deppermann, Charles E., **Are thunderstorms around isolated island stations in the Philippines frontal?** *U. S. Air Weather Service, Report* No. 820, **1944.** (From *Philippines Weather Bureau, Meteorological Bulletin*, Jan. 1936. p. 13–18. 5 tables.) **DWB**—Examination of records at Basco for 1930–1935 and of air mass movements and characteristics of region indicate that thunderstorms are frontal; yet daily convection effect of summer heat is important. *Subject Headings:* **Thunderstorms, Philippines.**

H–136 551.515.4:551.515.8:551.577.3

§Dexter, R. V., **The diurnal variation of warm-frontal precipitation and thunderstorms.** *Royal Meteorological Society, Quarterly Journal*, 70:129–137, April **1944.** 7 figs., 6 refs. **DLC**—The observed enlargement of warm front precipitation areas at night and the tendency of frontal thunderstorms to occur at night are explained in terms of diurnal variation in potential instability. Maximum potential instability is developed in the late afternoon but is realized only after lifting at the frontal surface, so that maximum rainfall is reached 6–10 hours later. A similar mechanism affects the frequency of thunderstorms, since latent instability may develop through lifting of a potentially unstable air mass. Theory illustrated. *Subject Headings:* **Thunderstorms, Precipitation, Warm fronts.**—*From author's summary.*

H–137 551.515.4:551.588.4:525.6

Feldman, R. L., **The Potomac a barrier to thunderstorms?** *American Meteorological Society, Bulletin*, 25:369, **1944.** **DWB**—Fishermen think that thunderstorms may be deflected when tide is flooding. *Subject Headings:* **Thunderstorms, Tides.**

H–138 551.515.4:551.501.7:551.509

Great Britain, Admiralty, Hydrographic Dept., Naval Meteorological Branch, **Use of tephigrams for forecasting thunderstorms.** M.M. No. 3, London, **1944.** 2 p. **DWB**—Procedure outlined. Estimation of maximum temperature and dew point is the critical factor in forecasting nonfrontal thunderstorms. *Subject Heading:* **Thunderstorm forecasting.**

H–139 551.515.4:629.13

Hoyt, John R., **Thunderhead.** *Flying*, 34:57, 126, 132, Jan. **1944.** photo. **DLC**—An elementary explanation of the nature of cumulonimbus showing how they can be recognized and what a pilot must do in case he must fly through. *Subject Headings:* **Thunderstorms, Aviation.**

H–140 551.515.4 551.594.21

Israël, Hans, **Sprunghafte Änderung des luftelektrischen Feldes und Gewitter.** [Sudden changes in atmospheric-electric field and thunderstorms.] *Meteorologische Zeitschrift*, 61:1–8, **1944.** 15 figs., 2 tables, 10 refs., 4 equations. **MH-BH**—Plan of field of variograph used, some sample recordings during thunderstorms, a statistical table of thunderstorm observations and sudden changes of electric field, for the period 1939–1941. Application of results to short range forecasting. *Subject Headings:* **Thunderstorms, Atmospheric electricity, Thunderstorm forecasting.**

H–141 551.515.4(75)(77)

†*Means, Lynn L. and others, **Analyses of thunderstorms in the south and central United States.** University of Chicago, [**1944.**] 33 p. 92 figs., tables, 19 refs. (Manuscript.) **DWB**—Detailed analytical work discussing individual occurrences of thunderstorms at certain stations, and general outbreaks of thunderstorms that were selected. Thunderstorm classification outlined, and causal factors discussed in detail. *Subject Headings:* **Thunderstorms, South and Central United States.**

H–142 551.515.4(77)

§Means, Lynn L., **The nocturnal maximum occurrence of thunderstorms in the midwestern states.** *University of Chicago, Institute of Meteorology, Miscellaneous Reports*, No. 16, **1944.** p. 38. 29 figs., 7 refs., equation. **MH-BH**—Observations on frequency and dates of nocturnal thunderstorm occurrences are recorded. Factors relating to nocturnal maximum are considered. *Subject Headings:* **Thunderstorms, Middle West.**

H–143 551.515.4:551.509(764)(786)

§Peet, Josephine, **Analysis and forecasting of thunderstorms at San Antonio.** University of Chicago, Dept. of Meteorology, **1944.** 27 p. 12 figs., 5 tables, 19 refs. **DWB**—Climatological factors. Case studies of forecasting.

Analysis and forecasting thunderstorms at Great Falls, Montana. University of Chicago, Dept. of Meteorology, **1944.** 19 p. 14 figs. **DWB**—Climatology. Case analysis. Occurrence with wind shear zones. *Subject Headings:* **Thunderstorms, Texas, Montana.**

H–144 551.510.535:551.515.4

§Stoffregen, W., **Ionospheric measurements in connection with thunderstorm research.** *Arkiv for Matematik, Astronomi och Fysik, Stockholm*, 30(4), No. 19, **1944.** 10 p. 13 figs., 6 refs., equations. **DLC**—At the Institute of High Tension Research, Upsala, complete equipment for ionospheric research has been constructed and operated to study the relation between thunderstorms and conditions in the ionosphere. The ionization in E and F layers has been measured continuously and the abnormal increase in E region ionization often observed during summer is found to be caused

by thunderstorms. During strong earth magnetic activity the effect of thunderstorms on the ionosphere is found to be much lower. These investigations are to continue over several thunderstorm periods. *Subject Headings:* **Thunderstorms, Ionosphere, Magnetic disturbances.**—*Author's abstract.*

H–145 551.515.4:551.509

U. S. Air Weather Service, **Forecasting thunderstorms by the slice method. Pt. I. Determination of atmospheric stability by the slice method,** by Norman R. Beers. **Pt. II. Some examples of the application of the slice method for thunderstorm forecasting,** by Forecast Branch. *Report,* No. 798, Washington, D. C., **1944.** 43 p. 12 figs., refs., equations. **DWB**—Part I gives techniques and a routine for analysis of surface synoptic charts, upper air charts, radiosonde reports, etc., and discussion of the theory involved along with selected examples. Part II includes seven cases selected because the parcel method indicated the possibility of a convective (air mass) thunderstorm, or the forecaster felt that frontal lifting was enough to set off a thunderstorm. *Subject Heading:* **Thunderstorm forecasting.**

1945

H–146 551.515.4(471.1)

§Ångström, Anders, **Åsk och överspänningforskning.** [Thunderstorm and discharge investigations.] Modén, Helge, **Åskvädrens geografiska fördelning i Sverige.** [The geographical distribution of thunderstorms in Sweden.] Persson, Walter, **Synoptisk-aerologisk studie över åskväder under sommaren 1944.** [Synoptic-aerological study of thunderstorms in the summer 1944.] Lindholm, Ferdinand, **Om sambandet mellan solaktivitet och åskfrekvens.** [On the connection between solar activity and thunderstorms.] *Sweden, Meteorologiska och Hydrologiska Institut, Meddelanden, Ser. B.,* No. 1, **1945.** 31 p. figs., tables, equations, in each article. Summary and review in English p. 29–31. **DWB**—Reports are given on a series of investigations of thunderstorms in Sweden conducted under the auspices of the Swedish Academy of Engineers. These reports refer to the work of the committee on the meteorological-geographical aspects of the problem. Two chief fields of research are proposed, (1) coordination of the reports of thunder and lightning and investigation of possibilities to build up an effective net for reports and forecasts, and (2) a study of the meteorological and geographical factors determining the discharge. Charts and data are included in each report individually. *Subject Headings:* **Thunderstorms, Thunderstorm electricity, Thunderstorm forecasting, Sweden.**

H–147 551.578.1:551.558.1:629.13

Buell, C. E., **Down drafts caused by heavy rain.** *Journal of Aeronautical Meteorology,* 1:140–143, **1945. DLC**—A relation between rate of precipitation at the ground, height of fall, and resulting downdraft under rather ideal assumptions is derived and discussed with regard to aircraft operations. *Subject Headings:* **Rain, Vertical currents, Aviation.**

H–148 551.515.4:551.578.7

Buell, C. E., **The occurrence of hail in thunderstorms.** *Journal of Aeronautical Meteorology,* 1(3):120–128, April **1945.** 17 figs., 2 tables, 7 refs. **DLC**—Consideration of ratio of occurrence of thunderstorms to that of hail as a measure of general thunderstorm intensity is proposed. On this basis the geographical distribution of thunderstorm intensity over the U. S. is considered together with the annual variation of thunderstorm intensity at several points. *Subject Headings:* **Thunderstorms, Hail.**—*From author's abstract.*

H–149 551.515.4:551.594.6:551.501.81

Bureau, Robert, **La localisation radioélectrique des orages.** [Radioelectric location of thunderstorms.] *La Météorologie,* p. 149–162, July–Dec. **1945.** 4 figs., refs. **DWB**—Principles based on using special goniometers are discussed for localizing thunderstorms. Registering of atmospherics adapted for determining storms close or distant. Examples of method given. *Subject Headings:* **Thunderstorms, Sferics, Radar storm detection, Goniometers.**

H–150 551.509.5:551.515.4

Chesebrough, Paul M., **Forecasting areas of nocturnal thunderstorms.** *Journal of Aeronautical Meteorology,* 2:18–25, **1945.** 9 figs. **DLC**—Types of nocturnal thunderstorms are defined. Reasoning and procedures of forecasting the area in which such storms are most likely to occur are explained. Figures show some examples of forecasting by this method and suggest the wide variation in shape the area may assume. *Subject Headings:* **Thunderstorms, Thunderstorm forecasting.**

H–151 551.515.4:525.6

Goldstein, W. I., **Thunderstorms and the tide at New York.** *American Meteorological Society, Bulletin,* 26:152, **1945. DWB**—Very brief report. Negative conclusion. *Subject Headings:* **Thunderstorms, Tides.**

H–152 551.515.4(768)

*Means, Lynn L., **Analysis of thunderstorms at Nashville.** University of Chicago, June **1945.** 39 p. 10 figs., 14 tables, ref. (Manuscript.) **DWB**—Causes, frequencies, types, synoptic discussions. *Subject Headings:* **Thunderstorms, Tennessee.**

H–153 551.515.4:551.509.317

Poulter, R. M., **Radiosondes and thunderstorm forecasting.** *Royal Meteorological Society, Quarterly Journal*, 71:294–297, **1945.** Discussion p. 297–317. **DWB**—Use of tephigrams in forecasting plus forecasting of wet-bulb reading and its relation to temperatures aloft as shown by the radiosonde for thunderstorm forecasting. *Subject Headings:* **Thunderstorm forecasting, Radiosondes.**

H–154 551.557.3:551.509

Riehl, Herbert, **Subtropical flow patterns in summer.** University of Chicago, **1945.** 147 p. 15 figs., 16 tables, 11 refs. (Mimeographed.) **DWB**—Report deals with some summertime forecasting problems of that portion of the subtropics which has its maximum rainfall in summer with particular interest in Gulf Coast of U. S. Basis for this study rests on detailed analysis of upper air, especially of the continuous changes that result from interaction between the two major zonal currents. *Subject Headings:* **Upper air winds, Weather forecasting.**

H–155 551.594.221 551.515.4(71)

Ruedy, Richard, **The distribution of thunderstorms and the frequency of lightning flashes.** A review. *Canada, National Research Council, Report* No. 1282, 2nd ed., **1945.** 70 p. Unchecked. —Frequency of thunderstorm days per year in Canada tabulated. Some information on other countries. Various aspects of lightning flashes, damage, protection, etc. considered. *Subject Headings:* **Thunderstorms, Lightning, Canada.**

1946

H–156 551.515.4:551.576.1

Beers, Norman R., **Thunderstorms and the freezing level.** *American Meteorological Society, Bulletin*, 27(2):54–58, **1946.** 2 figs., 10 refs., 3 equations. **DWB**—Thermodynamical processes are developed, considering in detail phase changes from water to ice or snow. Emphasis of the importance of the freezing level may help clarify problem of thunderstorm forecasting. Suggestions given for controlled test and statistical studies of phase changes. *Subject Headings:* **Thunderstorms, Cloud physics, Zero isotherm.**

H–157 551.594.21

Bricard, J., **Le champ électrique dans les nuages orageux et la séparation des charges.** [The electrical field in thunderclouds and the separation of charges.] *La Météorologie*, p. 419–428, Oct.–Dec. **1946.** Unchecked. *Subject Heading:* **Thunderstorm electricity.**

H–158 551.515.4:551.501.81

Brooks, Herbert B., **A summary of some radar thunderstorm observations.** *American Meteorological Society, Bulletin*, 27:557–563, **1946.** 11 figs., table, 6 refs. **DLC**—Direct observation of rain areas by radar yields new information on thunderstorm characteristics and behavior. A statistical summary of characteristics of 300 showers observed by radar at Spring Lake, N. Y., June–Aug. 1945, is given. *Subject Headings:* **Thunderstorms, Radar storm detection.**—*Author's abstract.*

H–159 551.515.4(42)

§Douglas, C. K. M. and Harding, J., **The thunderstorm of the night of July 14–15, 1945.** *Royal Meteorological Society, Quarterly Journal*, 72:323–331, Oct. **1946.** 5 figs., 2 refs. **DWB**—Detailed synoptic, aerological and climatological analysis of this widespread heavy storm. Synoptic charts show a retrograde front preceded the storm from the ENE, with unusually warm air over France and extremely steep lapse rates. *Subject Headings:* **Thunderstorms, England.**

H–160 551.515.4(267)

Inglis, J. M., **Flying in cumulonimbi over the Indian Ocean.** *American Meteorological Society, Bulletin*, 27:129–130, **1946.** **DWB**—Refers to violent vertical currents, lightning, etc. *Subject Headings:* **Thunderstorms, Indian Ocean.**

H–161 551.511:551.515.4

†Normand, Charles, **Energy in the atmosphere.** *Royal Meteorological Society, Quarterly Journal*, 72:145–167, **1946.** 7 figs., 23 refs., 4 equations. **DLC**—Discussion from the standpoint of *total heat*

of the problem of the amount of heat from the sun which is converted into air movement and conditions under which this transformation from heat into wind takes place. Propositions of Max Margules on total heat of a closed atmospheric system are interpreted and expanded. Part of conclusions state that a brief consideration of the heat-drop in cumulonimbus clouds leads to a realization that the available energy is very largely dependent on the mode of descent of the down currents required to compensate the up currents. *Subject Headings:* **Thermodynamics of the atmosphere, Thunderstorms.**

H–162 551.515.4:551.578.1(759)

U. S. Air Weather Service, **Thunderstorm study for Orlando, Florida.** New Orleans, La., **1946.** tables. (Mimeographed.) **DWB**—Data from studies concerning mostly amount of precipitation occurring with thunderstorms at Orlando for summer periods 1941–1945. *Subject Headings:* **Thunderstorm rainfall, Florida.**

H–163 551.515.4:551.501.81

Wexler, Raymond, **Radar photographs of a frontal thunderstorm passage.** *American Meteorological Society, Bulletin*, 27:575, **1946.** **DWB**—Short, detailed report of radar observations of this series of storms. *Subject Headings:* **Thunderstorms, Radar storm detection.**

1947

H–164 551.515.4:551.501.81

Coons, Richard D., **Guided propagation of radar in thunderstorm conditions.** *American Meteorological Society, Bulletin*, 28:324–329, Sept. **1947.** 8 figs., 3 refs. **DLC**—Explanation given of guided propagation, or trapping, of radar beams. Example cited when stable conditions favorable to the formation of a trapping duct existed after the passage of a thunderstorm. *Subject Headings:* **Thunderstorms, Radar storm detection, Atmospheric ducts.**

H–165 551.594.25:551.515.4

Gunn, Ross, **The electrical charge on precipitation at various altitudes and its relation to thunderstorms.** *Physical Review*, 71(3):181–186, Feb. 1, **1947.** 5 figs. **DWB**—Free electrical charges on individual precipitation particles were measured at various altitudes to 26,000 ft. In a weak cold front with no thunderstorm activity, and with freezing level at 11,000 ft., positive charges alone were observed from 20,000 to 26,000 ft., etc. Electric field measurements on the airplane showed that the particle charges were largely neutralized by nearby charges either in the air or on the cloud droplets. Removal of this neutralizing charge will immediately produce thunderstorm electric fields and potentials. Charts show the measured electric fields on airplane before and after it was struck by lightning. Such strokes are thought to result from a redistribution of electric charge when vertical air currents separate the neutralizing positive and negative charges. *Subject Headings:* **Thunderstorms, Electricity of precipitation.**

H–166 551.515.4(42)

§Lewis, L. F., **Thunderstorm of June 27, 1947.** *Meteorological Magazine, London*, 76:179–185, **1947.** 4 figs., table. **DWB**—Synoptic analysis of unusually heavy storm near London. *Subject Headings:* **Thunderstorms, England.**

H–167 551.594.21 551.594.221

Norinder, Harald, **Some aspects and recent results of electromagnetic effects of thunderstorms.** *Franklin Institute, Journal*, 244:109–130, Aug.; 167–208, Sept., **1947.** 70 figs., 13 refs., equations. **DWB**—Comprehensive article on electromagnetic properties and effects of lightning discharges obtained at the Institute of High Tension Research of the University of Uppsala mainly during wartime and up to date. Results are divided into parts: (1) Variations of the electric and magnetic fields as caused by lightning discharges; (2) current variation in lightning discharges; (3) the oscillographic investigation of direct igniting and killing lightning stroke. *Subject Headings:* **Thunderstorm electricity, Lightning, Magnetic disturbances.**

H–168 551.515.4(471.1)(48)

Oksanen, Kaino W., **Répartition géographique des jours d'orage en Fennoscandie.** [Geographic distribution of thunderstorm days in Finland and Scandinavia.] *Finland, Ilmatieteelisen Keskulaitoksen toimituksia*, No. 30, **1947.** 14 p. 5 figs. **MH-BH**—Statistical report and comparison of thunderstorm frequency in Finland, Scandinavia and ajacent areas, based on data from the various countries. *Subject Headings:* **Thunderstorms, Scandinavia, Finland.**

H–169 551.515.4:551.54:551.511

Schaffer, W., **The thunderstorm high.** *American Meteorological Society, Bulletin*, 28:351–355, Oct. **1947.** 4 figs., 7 refs., equations. **DWB**—Theoretical calculations made to determine a more general method of estimating pressure effects during a thunderstorm. Equations are formulated for determining vertical accelerations which can be applied to accelerations in any direction. *Subject Headings:* **Thunderstorms, Pressure variations, Vertical currents.**

H–170 551.511:551.576.11

Stommel, H., **Entrainment of air into a cumulus cloud.** *Journal of Meteorology*, 4:91–94, **1947.** 6 figs., table, 4 refs., 5 equations. **MH-BH**—A theory of convective clouds is presented: the fundamental hypothesis being that the ascending current in a cloud entrains air from its surrounding. Method given for computing amount of entrainment. *Subject Headings:* **Cumulus clouds, Entrainment.**

H–171 551.515.4:551.511

Tolefson, Harold B., **Preliminary analysis of NACA measurements of atmospheric turbulence within a thunderstorm—U. S. Weather Bureau Thunderstorm Project.** *U. S. National Advisory Committee for Aeronautics, Technical Note*, No. 1233, March **1947.** 8 p. 3 figs., 2 tables, 3 refs., equation. **DLC**—Report of Thunderstorm Project field operations around Orlando, Fla. Summary of acceleration and gust velocity measurements within a thunderstorm given, along with time histories of acceleration for traverses through a thundercloud and time variations of atmospheric turbulence measured within thunderclouds. *Subject Headings:* **Thunderstorms, Turbulence, Vertical velocities.**

H–172 551.515.4:551.577.3

†*U. S. Weather Bureau, **Thunderstorm rainfall. Parts I and II.** Vicksburg, Mississippi, Waterways Experiment Station, **1947.** Part I, 331 p. 32 tables, numerous refs., p. 304–327, as well as at end of each chapter. Part II, 155 p. 155 figs. (bound separately). At head of title: *Hydrometeorological Report*, No. 5, **1947. DWB**—A major work. Theories of thunderstorm structure and dynamics are reviewed: factors of instability of atmosphere, updrafts and downdrafts, rain formation, thunderstorm cell models, lightning, etc. Chap. II deals with thunderstorm climatology: distribution, comparison of thunderstorms with precipitation distribution and intensities, areal rainfall frequency, hail, tornadoes etc., and diurnal variations of thunderstorm frequency. Chap. III discusses the reliability of areal rainfall determination. Chap. IV, the hydrologic aspects of thunderstorm rainfall. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm rainfall, Climatology.**

H–173 551.515:551.501.81

Wexler, Raymond and Swingle, Donald M., **Radar storm detection.** *American Meteorological Society, Bulletin*, 28:159–167, **1947.** 6 figs., 2 tables, 11 refs., 9 equations. **DLC**—The theory on radar storm detection is derived. *Subject Heading:* **Radar storm detection.**

1948

H–174 551.576.11:551.509

Austin, James M., **A note on cumulus growth in a non-saturated environment.** *Journal of Meteorology*, 5:103–107, **1948.** 3 figs., table, 5 refs. **DWB**—On the basis of certain evidence it is concluded that mixing between the cumulus cloud and its environment affects the development of the cloud. It is shown that, for the case of mixing, the lapse rate of temperature within the cloud is greater than the moist adiabatic rate and also that low relative humidities within the environment disfavor the cloud growth. A synoptic study supports the hypothesis that the forecast of convective showers should take into consideration the relative humidity above the convective condensation level. *Subject Headings:* **Cloud formation, Cumulus clouds, Thunderstorm forecasting.**—*Author's abstract.*

H–175 551.515.4(759)

Byers, Horace R. and Rodebush, Harriet R., **Causes of thunderstorms of the Florida peninsula.** *Journal of Meteorology*, 5(6):275–280, Dec. **1948.** 3 figs., 9 refs. **DWB**—As a result of the Thunderstorm Project research in Florida a theory is proposed that large scale horizontal convergence in the low levels, rather than factors of temperature and humidity, is the necessary condition for thunderstorm convection. *Subject Headings:* **Thunderstorms, Florida.**

H–176 551.515.4

*†Byers, Horace R. and Braham, Roscoe R., Jr., **Thunderstorm structure and circulation.** *Journal of Meteorology*, 5(3):71–86, June **1948.** 23 figs., 16 refs. **DWB**—Data from Thunderstorm Project

observations in Florida, derived mainly from airplane traverses through thunderstorms, are analyzed to obtain a description of thunderstorm structure and circulation. The independent convective cells of which thunderstorms consist are comprehensively discussed. An example of a thunderstorm with typical structure and vertical currents is given. Thermodynamics of circulation are considered at length. *Subject Heading:* **Thunderstorm dynamics.**

H–177 551.515.4:551.578.1:551.501.81

Byers, Horace R. and collaborators, **The use of radar in determining the amount of rain falling over a small area.** *American Geophysical Union, Transactions*, 29:187–196, April **1948.** 12 figs., table, 11 refs. **DWB**—Radar storm echoes and rain gage data are compared. Found that radar can measure rainfall about as accurately as a micronetwork of rain gages. For thunderstorms it is found that the areas of rainfall can be determined with accuracy by the radar. *Subject Headings:* **Thunderstorm rainfall, Radar storm detection.**

H–178 551.515.4(569.4)(62)

§El-Fandy, M. G., **The effect of the Sudan monsoon low on the development of thundery conditions in Egypt, Palestine, and Syria.** *Royal Meteorological Society, Quarterly Journal*, 74(319):31–38, Jan. **1948.** 8 figs., plate, 2 tables, 3 refs. **DLC**—Autumn thunderstorm conditions which often develop in this region in autumn are found to occur when the Sudan monsoon low intensifies towards the north and supplies the eastern Mediterranean with a warm south-easterly current. Detailed synoptic analysis. *Subject Headings:* **Thunderstorms, Sudan monsoon, Egypt, Palestine, Syria.**

H–179 551.515.4:551.577.21:551.509

Fletcher, Robert D., **Computation of thunderstorm rainfall.** *American Geophysical Union, Transactions*, 29:41–50, **1948.** 4 figs., table, 9 refs., 9 equations. **DWB**—The rainfall of a young thunderstorm is shown to be expressible as the product of qG, the average surface specific humidity of the air entering the storm, and C, the "convergence factor," which is a function of the cloud base dimensions and of the wind blowing into the region beneath the cloud. For purposes of estimating the maximum possible thunderstorm precipitation it is shown that qG and C may be maximized through statistical study of weather records. Two methods suggested for the problem of quantitative precipitation forecasting. *Subject Headings:* **Thunderstorm rainfall, Weather forecasting.**—*From author's abstract.*

H–180 551.515.4:551.509:632.187(794)

†*Gray, L. G., **California thunderstorms in relation to the lightning fire problem.** U. S. Weather Bureau, San Francisco, Calif., **1948.** 267 p. 118 figs., 41 tables, 71 refs. (Manuscript.) **DWB**—Essentials of problem of forest fires from lightning from the meteorological point of view are stated. This study is first in a series dealing with California thunderstorms in relation to lightning fires with emphasis on statistical study, the objects of the latter being portrayal of existing situation and working out of applications to practical forecasting. *Subject Headings:* **Thunderstorms, Forest fires, Weather forecasting, California.**

H–181 551.515.4:551.579.4(44)

Grisollet, H., **Étude des averses orageuses de la région parisienne envisagées au point de vue de leur évacuation par les ouvrages d'assainissement.** [Study of the thunder showers of the Parisian region considered from the point of view of their runoff through the drainage system.] *La Météorologie*, No. 11:175–195, July–Sept. **1948.** 4 figs., 2 tables, 14 refs. **DWB**—Detailed study of rainfall statistics. Equations formulated for calculating average and maximum intensities, etc. *Subject Headings:* **Thunderstorm rainfall, Paris, France.**

H–182 551.594.21

Gunn, Ross, **Electric field intensity inside natural clouds.** *Journal of Applied Physics*, 19:481–484, May **1948.** 2 figs., 6 refs. **DLC**—Measurements of the electric field on the surface of aircraft flying through all types of weather and clouds are summarized. The measured electric field inside a thunderstorm just prior to a lightning strike at 12,900 feet was 3400 volts/cm. The average maximum field for 9 different thunderclouds was 1300 volts/cm. It is noted that large fields usually occur only inside the cloud and at altitudes somewhat comparable to the freezing level. Frequent reversals of the field are observed in these areas. The electric field measured inside a stable nonprecipitating cloud is less than 10 volts/cm. *Subject Heading:* **Thunderstorm electricity.**—*Author's abstract.*

H–183 551.515.4:551.577.37

†Horton, Robert E., **The physics of thunderstorms.** *American Geophysical Union, Transactions*, 29(6):810–844, Dec. **1948.** 25 figs., 3 tables, 22 refs., 72 equations. **DWB**—Study of thunderstorm

physics more from viewpoint of hydromechanics than of thermodynamics. Equations developed based on laws of continuity and fluid flow, from which dimensions and characteristics of a thunderstorm can be determined. Questions of limitation of rainfall splash, maximum limiting rain intensity of thunderstorm, rainfall pattern, condensation, evaporation, expansion and lift are considered. Study directed toward development of methods for determining maximum station-rain intensity from meteorological data. *Subject Heading:* **Thunderstorm rainfall.**—*From author's abstract.*

H–184 551.515.4(436)

*Lauscher, Friedrich and Tollner, Hanns. **Ostalpine Gewitter. (Vorläufige Bearbeitung der Österreichischen Gewitterbeobachtungen 1947.)** [Eastern alpine thunderstorms. (Preliminary statement of Austrian thunderstorm observations 1947.)] *Austria, Zentralanstalt für Meteorologie und Geodynamik, Jahrbücher*, 84, **1948.** Appendix, 7, to the *Jahrbuch für 1947*, p. D40–D46. 5 tables. **DWB**—Thunderstorm statistics for Austria for 1947, including hail and lightning observation. *Subject Headings:* **Thunderstorms, Hail, Lightning, Austria.**

H–185 551.515.4(43)

Menzl, O., **Häufigkeit von Gewittertagen und ihre markanten Punkte auf dem Donnersberg** [Frequency of thunderstorm days and their characteristics at Donnersberg.] *Zeitschrift für Meteorologie*, 2:369–372, **1948.** 2 figs., 4 tables, 5 refs. **DWB**—Brief statistical report. *Subject Headings:* **Thunderstorms, Germany.**

H–186 551.515.4(471.1)

*Oksanen, Kaino W., **Die Gewitter in Helsinki.** [Thunderstorms in Helsinki.] *Geophysica Helsinki*, 3:93–101, **1948.** 6 figs., refs. English summary. **MH-BH**—Statistical report on frequency, duration and other characteristics of thunderstorms in Helsinki from records during years 1887–1947. *Subject Headings:* **Thunderstorms, Helsinki, Finland.**

H–187 551.594.21

Rossmann, Fritz, **Der Ursprung der Gewitterelektrizität.** [The source of thunderstorm electricity.] *Wetter und Klima*, 1(1–2):2–7, Jan.–Feb. **1948.** 2 refs. **DWB**—Brief semi-popular explanation. *Subject Heading:* **Thunderstorm electricity.**

H–188 551.515.4:629.13

U. S. Air Materiel Command, All-Weather Flying Division, **Operational feasibility of aircraft through thunderstorms.** *Civil Aeronautics Administration, Washington, D. C., Aviation Release* No. 304, Oct. 29, **1948.** 23 p. graph. (Mimeographed.) **DLC**—Description of Thunderstorm Project, network, equipment, instrumentation of aircraft, flight procedures, summary of flights, gust structure encountered in thunderstorms, flight hazards, hail, icing, lightning, effect of speed of plane, conclusions; rules for safe flying in thunderstorms. Brief summaries of data pertinent to flying. A very useful report based on a great deal of experience in a limited geographic area (Florida, Ohio). *Subject Headings:* **Thunderstorms, Aviation, Turbulence.**

H–189 551.515.4:629.13

*U. S. Weather Bureau, **A report on thunderstorm conditions affecting flight operations.** *Technical Paper*, No. 7, **1948.** 32 p. 13 figs., 20 tables, 15 refs. **DWB**—Discussed from the standpoint of flight operations, it is concluded that the thunderstorm, though a very complex structure, has basic circulation features following an identifiable pattern in the various stages of the storm's life cycle. Definite altitude distributions of weather elements within the storm are determined. Possibility presented of forecasting maximum intensity of turbulence aloft and intensity and direction of the gusty outflow winds at the surface. Other characteristics relative to flying in thunderstorms are discussed. *Subject Headings:* **Thunderstorm dynamics, Aviation.**

H–190 551.594:551.515.4

Wall, Ernst, **Die elektrischen Vorgänge in der Atmosphäre als geschlossene Erscheinung.** [The electrical processes in the atmosphere as continuous phenomena.] *Meteorologische Rundschau*, 1(7/8):195–200, **1948.** Review by Hans G. Macht, *Journal of Geophysical Research*, 54:72–73, March **1949. DLC**—Author conceives all processes of atmospheric electricity as a closed phenomenon consisting of a continuous series of single features harmonically following each other. Thunderstorm regarded as an enormous enlargement of all-day atmospheric-electric processes. Turbulence not considered to be of dominant significance. Importance with respect to production and separation of charges, however, is assigned to snow crystals in the ice region of thunderclouds. *Subject Headings:* **Atmospheric electricity, Thunderstorms.**

H–191 551.515.4

Wall, Ernst, **Das Gewitter. I. Die Elementarvorgänge der Elektrizitätsproduktion.** [The thunderstorm. I. The elementary processes of electricity production.] *Wetter und Klima*, 1:7–21, **1948.** 6 refs. **DWB**—Also subsequent articles in the same series. **Das Gewitter II. and III.** *ibid.*, nos. 5/6, 7/8, and 11/12, **1948.** Semi-popular work on various phases of thunderstorm electricity, mechanics, formation, dynamics, distribution, etc. No data, or synoptic charts, etc. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm electricity.**

H–192 551.511:551.509

§Whiting, R. M., **A method of forecasting the degree of turbulence in fronts and line squalls.** Eastern Air Lines, Inc., Meteorological Dept., Atlanta, Georgia, **1948.** 22 p. 11 figs., tables, 6 refs., 4 equations. (Mimeographed.) **MH-BH**—Eastern Air Lines' program to devise a method for forecasting turbulence associated with fronts and line squalls is outlined; results are analyzed, and conclusions drawn. See also: **Eastern Air Lines meteorologists revise turbulence forecast method,** *American Aviation*, Wash., 11(7):25, Sept. 1, 1947. **DLC**—*Subject Headings:* **Turbulence, Line squalls, Fronts, Weather forecasting.**

H–193 551.515.4:551.594.21:551.594.221

†Wichmann, Heinz, **Grundprobleme der Physik des Gewitters.** [Fundamentals of thunderstorm physics.] *Physikalische Forschung*, No. 1. Hannover, Wolfenbütteler Verlangsanstalt, **1948.** 118 p. 63 figs., 6 tables, 60 refs., equations. **MH-BH**—Detailed, well-illustrated treatment of the technical problems of dynamics and electricity of thunderstorms, with emphasis on the latter. Among particular aspects treated are: thunderstorm probability with varying surface and aerological conditions, lability, vertical currents (methods of measurement, estimation from energy diagrams; actual speed of vertical motion and critical speeds for thunderstorm formation); colloidal processes in cumulus clouds and precipitation formation (sublimation, nucleation, supercooling, electrical processes connected with freezing); the electrical field in the vicinity of a thundercloud; the zero isotherm (relation to precipitation and electric fields in fair weather cumulus, shower and thunderclouds), the cause of lightning (effect of surface features); the influence of lightning on the electric field (cloud strokes, ground strokes and comparison with laboratory strokes); variations in the earth's field as a consequence of cloud fields and discharges; atmospherics due to thunderstorm activity, etc. Most important theories of local and general application are reviewed and sources cited. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm electricity, Lightning.**—*M.R.*

H–194 551.576.11:551.594.21

Wichmann, Heinz, **Die Entwicklung von Quell- und Gewitterwolken.** [The development of cumulus and thunderclouds.] *Annalen der Meteorologie*, 1:345–346, **1948.** **MH-BH**—Findeisen's ideas about the formation of cumuli and their elements of precipitation are based on the conception of a uniform upward motion of the air masses over the whole cross section of the cloud. However, observations from a glider showed that the anabatic wind in cumulus is in the main confined to a funnel shaped anabatic current. The resulting conclusions for the microphysical development of cumuli and thunderstorm clouds are discussed. *Subject Headings:* **Thunderstorm dynamics, Cumulus clouds.**—*Author's abstract.*

H–195 551.515.4:551.515.8

§Williams, D. T., **A surface micro-study of squall-line thunderstorms.** *Monthly Weather Review*, 76:239–246, **1948.** 13 figs., table, 3 refs. **MH-BH**—Results reported of a microstudy of squall lines, using data from automatic weather stations in a closely-spaced network of Cloud Physics Project at Wilmington, Ohio, over an eight months period. Detailed analysis thus made of a number of squall line thunderstorms such as was not previously possible by ordinary methods of macroanalysis. Method of microanalysis explained, with figures showing surface microsynoptic charts and data. *Subject Headings:* **Thunderstorms, Line squalls.**

H–196 551.594.21

Workman, E. J., **A suggested mechanism for the generation of thunderstorm electricity.** *Physical Review, 2nd Ser.*, 74:709, Sept. 15, **1948.** **DLC**—Short discussion and development of effects of tests wherein large differences of potential were developed between the liquid and solid phases of water when rapid freezing was in progress. This process appears to satisfy the requirements for the initial electrification in thunderstorms. *Subject Headings:* **Thunderstorm electricity, Cloud physics.**

H–197 551.515.4:551.582:551.577.38(43)

Zimmermann, Gerhard, **Zur Gewitterhäufigkeit in heissen, trockenen Sommern.** [On thunderstorm frequency in hot, dry summers.] *Meteorologische Rundschau*, 1(15–16):470–471, Sept.–Oct. **1948.** ref. **DWB**—The author tests the theory advanced by Scherhag that thunderstorm activity

increases with increasing temperature. It is shown that for Bad Kissingen (1908–1946) hot summers are also wetter than normal and vice versa, and that hot and wet summers have above average thunderstorm activity more than five times as often as do cold, dry summers. However, the actual deviation from normal is not very pronounced. *Subject Headings:* **Thunderstorms, Climatology, Bad Kissingen, Germany.**—*M.R.*

1949

H–198 551.515.4:551.508.8

American Airlines, **The development of an airborne radar method of avoiding severe turbulence and heavy precipitation in the precipitation area of thunderstorms and line squalls.** *American Airlines System, Publication*, Sept. **1949.** Unchecked. **DWB**—*Subject Headings:* **Thunderstorms, Line squalls, Turbulence, Radar storm detection.**

H–199 551.515.4:551.515.

Andre, Milo J., **Distribution of instability weather types with respect to summer cold fronts in the United States.** *American Meteorological Society, Bulletin*, 30:228–230, June **1949.** 3 figs. **DLC**—Concluded from data presented that in summer in the midwestern U. S. the large proportion of thunderstorms occurring with eastward moving cold fronts appear well ahead of the front itself; in fact, true frontal thunderstorms are in the minority. In some cases, at least, a very distinct maximum of activity occurs about 150 miles ahead of the front. *Subject Headings:* **Thunderstorms, Cold fronts, United States.**

H–200 551.51

Bellamy, John C., **Objective calculations of divergence, vertical velocity and vorticity.** University of Chicago, **1949.** 11 p. 3 figs., 2 refs., 10 equations. (Manuscript.) **DWB**—Some methods of calculating the horizontal divergence, vertical velocity, and vorticity directly from wind observations without first analyzing the wind field, are described. For these calculations volumes or areas determined by the actual locations of the points of observations, rather than by arbitrary coordinate systems are used. *Subject Headings:* **Vorticity, Vertical currents.**

H–201 551.515.4(45)

*§Bossolasco, Mario, **La distribuzione dei temporali in Italia.** [The distribution of thunderstorms in Italy.] *L'Energia Elettrica*, 26(11–12), **1949.** 12 figs., 3 tables, 10 refs. **MH-BH**—Discusses causes and nature of thunderstorms, mentioning different types, warm front, orographic, advection, frontal and prefrontal. Frequency and distribution of thunderstorms are shown graphically on charts of Italy for different years, seasons; diurnal and secular variations given, etc. *Subject Headings:* **Thunderstorms, Italy.**

H–202 551.54:551.515.4

§Brunk, Ivan W., **Pressure pulsations of April 11, 1944.** *Journal of Meteorology*, 6:181–188, **1949.** 15 figs., table, 12 refs. **DWB**—Windstorms of 11 April 1944, were associated with the eastward movement of a large pulsation in pressure and strong easterly surface winds. Barograph and wind records from many stations are used to show the hourly movement of this pulsation. Precipitation records from the hydrologic network of recording rain gages are used to determine the hourly movement of a sequence of four bursts of rainfall associated with thunderstorms, tornadoes and pressure pulsations. The pressure pulsation is shown to be an exceptional case of a phenomenon which is frequently overlooked, and about which as yet our knowledge of the physical processes involved is incomplete. *Subject Headings:* **Pressure variations, Thunderstorms.**—*Author's abstract.*

H–203 551.515.427:551.557

Byers, Horace R. and Hull, Edwin C., **Inflow patterns of thunderstorms as shown by winds aloft.** *American Meteorological Society, Bulletin*, 30(3):90–96, March **1949.** 9 figs., 9 refs. **DWB**—Balloons ascending simultaneously at various points around thunderstorms are followed by radar or radio-direction finding (rawins and rawinsondes) to determine horizontal inflow or outflow of the air. It is found that in the early stages of development of a thunderstorm cell, inflow or horizontal convergence is present at the ground, as well as at all heights reached by the cloud. In a mature thunderstorm cell, the observations show outflow or horizontal divergence under the cloud base and convergence at all heights between about 4,000 and 23,000 feet, with divergence again in the uppermost levels. Relationships to rainfall and to cloud entrainment of environmental air are shown. *Subject Headings:* **Thunderstorms, Upper air winds, Entrainment.**—*Author's abstract.*

H–204 551.578.11:551.515.4

Byers, Horace R., Moses, Harry, and Harney, Patrick J., **Measurement of rain temperature.** *Journal of Meteorology*, 6(1):51–55, Feb. **1949.** 8 figs., 7 refs. **DWB**—Description of instrument

used in measuring difference between rain and ambient air temperatures, and methods of calibrating equipment. Three types of curves result from measurements made during storms in Ohio. (1) a sharp drop in both air and rain temperature soon after rain begins but with greatest difference five minutes after onset (thunderstorm type); (2) tremendous difference a minute after onset (hail type), rapidly equalizing; and (3) slight variations of one curve from the other when air is initially cool and saturated. *Subject Headings:* **Rain temperature measurements, Thunderstorms, Hail.**—*M.R.*

H–205 551.515.4

†Byers, Horace R., **Principal results of a comprehensive investigation of the structure and dynamics of the thunderstorm.** *Tellus*, 1(4):6–17, Nov. **1949.** 5 figs., 16 refs., equation. **DWB**—Certain intensive investigations into the nature of thunderstorms in the U. S. have resulted in a new model of thunderstorm structure, life cycle and thermodynamics. Thunderstorms and their effects have been investigated by airplanes, radar, surface micronetworks and swarms of balloons. Some of the more significant aspects of these measurements are described. Sections discuss thunderstorm structure and circulation, thermodynamics of entraining, thunderstorm weather near the surface, electric fields, radar observations, effect of environment wind field, preferred areas of thunderstorm development, and squall lines. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm electricity, Radar storm detection.**—*From author's abstract.*

H–206 551.515.4:551.556

Byers, Horace R. and Battan, L. J., **Some effects of vertical wind shear on thunderstorm structure.** *American Meteorological Society, Bulletin*, 30:168–175, **1949.** 7 figs., 10 refs., equation. **DWB**—Some of the effects of wind shear on the structure of the thunderstorm are investigated by means of radar observations and analysis. *Subject Headings:* **Thunderstorm dynamics, Radar storm detection, Vertical currents.**

H–207 551.515.4

Byers, Horace R., **Structure and dynamics of the thunderstorm.** *Science*, 110: 291–294, Sept. 23, **1949.** fig. **DLC**—Brief description of the Thunderstorm Project and a summary of some of the results. System of observations is outlined, as well as the structure and life cycle of the thunderstorm in the cumulus stage, mature stage and dissipating stage. *Subject Heading:* **Thunderstorm dynamics.**

H–208 551.515.4:551.501.81:629.13

†*§Byers, Horace R. and Braham, Roscoe R., Jr., **The thunderstorm; report of the Thunderstorm Project.** (A joint project of four U. S. Government Agencies: Air Force, Navy, National Advisory Committee for Aeronautics, and Weather Bureau) Washington, D. C., U. S. Government Printing Office, June **1949.** 287 p. 254 figs., 49 tables, 63 refs., append. **MH-BH, DLC**—The final and most comprehensive of the score of reports issued on various phases of the Thunderstorm Project, containing, besides an excellent bibliography, lists of the published contributions of the Thunderstorm Project, 9 reports, three reports to the Chief, U. S. Weather Bureau, and miscellaneous items: handbook of project, technical report, etc., as well as six reports issued by the National Advisory Committee for Aeronautics. The introduction gives the history of the Project, design of observational system, areas of operations, and character of data obtained. Part I takes up thunderstorm structure and circulation: (1) convection and cell development, temperatures, entrainment; (2) turbulence and hydrometeors in thunderstorms; (3) thunderstorm weather near the surface: rainfall, wind, temperature, pressure, and humidity fields beneath thunderstorms; (4) electric fields inside thunderstorm; (5) use of radar in detecting and analyzing; (6) effect of environment wind field on existing thunderstorms; (7) preferred areas of thunderstorm development; (8) squall lines. Part II discusses the thunderstorm as it affects flight operations: airplanes in flight and ground operations. Part III describes in detail a series of examples of specific thunderstorms. Appended is information of equipment: surface, upper-air, radar, airplane, and photographic. *Subject Headings:* **Thunderstorms, Aviation, Radar storm detection.**—*M.R.*

H–209 551.515.4:551.509

Chalker, William R., **Vertical stability in regions of air mass showers.** *American Meteorological Society, Bulletin*, 30:145–147, **1949.** fig., table, 2 refs. **DWB**—This study considers the problem of the relationship between the vertical stability of the atmosphere and air mass showers produced by the sun's heating on a typical summer's day, in an effort to evolve a method for obtaining the probability of air mass showers and/or thunderstorms occurring at a particular station. Author concludes that the principal factor which controls air mass showers, in addition to surface heating, is relative humidity in the free atmosphere; he points out that it is unimportant how much steeper the lapse rate is than the moist adiabatic lapse rate. *Subject Headings:* **Thunderstorms, Thunderstorm forecasting.**

H–210 551.594 551.594.21

†Chalmers, John Alan, **Atmospheric electricity.** Oxford, Clarendon Press, **1949.** 175 p. 3[illegible] figs., tables, 248 refs., equations, append. **DLC**—A well-illustrated and indexed treatment in book form of the main aspects of atmospheric electricity with the exception of cosmic radiation, ionospheric exploration by radio, and earth currents. Full consideration is given to the electricity of thunderstorms and precipitation, the ionization and conductivity of the atmosphere, point discharges, separation of charges. The history of research on atmospheric electricity and the fundamental theories are given in the first two chapters. *Subject Headings:* **Atmospheric electricity, Thunderstorm electricity.**—*M.R.*

H–211 551.515.8:551.582(624) 551.515.4

§El-Fandy, M. G., **Forecasting the summer weather of the Sudan and the rains that lead to the Nile floods.** *Royal Meteorological Society, Quarterly Journal,* 75(326):375–398, Oct. **1949.** 21 figs., 4 tables, 6 refs. **DWB**—Summer pressure over Sudan shows a minimum in N.E. and a maximum in S.E., both fluctuating from day to day. Four types of disturbance are described: (1) Haboobs with strong S–SW monsoon winds and northward movement of pressure maximum and Intertropical Convergence Zone; (2) Haboobs with induced cold fronts set up by thunderstorms; (3) local instability thunderstorms when **ICZ** is furthest north; (4) high-level thunderstorms with widespread rain due to moist cold E-SE winds above 750 mb. level. Each type is illustrated by upper air curves and synoptic charts. *Subject Headings:* **Synoptic climatology, Atmospheric disturbances, Weather forecasting, Thunderstorms, Sudan.**—*M.R.*

H–212 551.515.4

Faust, Heinrich, **Über Gewitterstürme.** [On thunderstorm dynamics.] *Forschungen und Fortschritte,* 25:152+, **1940.** (Unchecked in original.) Abstract in *Meteorologische Rundschau,* 3(1–2):46, Jan.–Feb. **1950. DWB**—On the basis of observations of a thunderstorm near Frankfurt in July 1941 a theory is advanced that cold air masses form as a result of melting of ice particles which descend on the rear of the thunderstorm and pass below the freezing level. At the earth's surface the propagated cold air masses form a squall line. *Subject Headings:* **Thunderstorm dynamics, Squalls.**

H–213 551.594.21

Gunn, Ross, **The free electrical charge on thunderstorm rain and its relation to droplet size.** *Journal of Geophysical Research,* 54(1):57–63, March **1949.** 3 figs., tables, 4 refs., 2 equations. **DLC**—Using a new induction type of apparatus simultaneous measurements are made of the free electrical charge and the mass of raindrops falling from active thunderclouds. Free charges on raindrops are computed. Negative droplets are more massive than positive. After two droplets of one sign fall, there is a high probability that the next droplet will be of opposite sign. *Subject Headings:* **Thunderstorm electricity, Raindrops.**—*From author's abstract.*

H–214 551.515.4:551.594.6:551.501.81

Location of thunderstorms by radio. *Nature, London,* 163:75, **1949.** 4 refs. **DWB**—Storm location network of the Meteorological Office in British Isles and "sferics" apparatus employed are described. *Subject Headings:* **Thunderstorms, Methods of observation, Radar storm detection, Sferics.**

H–215 551.515.4(42)

Ludlam, F. H., **Observations of a thunderstorm from a small cumulo-nimbus.** *Meteorological Magazine, London,* 78(930):357–360, Dec. **1949.** 2 figs. **DWB**—Basingbourne, England, Oct. 4, 1948; cloud top below 15,000 ft.; temperature only −20°C. *Subject Headings:* **Thunderstorms, England.**

H–216 551.511:551.558

Malkus, Joanne S., **Effects of wind shear on some aspects of convection.** *American Geophysical Union, Transactions,* 30(1):19–25, Feb. **1949.** 7 figs., 13 refs., 10 equations. **DLC**—A jet ascending through a fluid possessing vertical shear of the horizontal wind will show a difference in horizontal velocity from that of the ambient air. The magnitude of the difference is shown to be a function of the vertical shear and the rate of entrainment of mass into the jet. The effect of this relative horizontal velocity on the slopes of dry thermals and on cumulus cloud processes is discussed. The observed horizontal asymmetries in the turbulence associated with trade cumulus are offered as an example. Theoretical work. *Subject Headings:* **Convection, Wind shear.**—*Author's abstract.*

H–217 551.515.4

Malurkar, S. L., **Mechanism of thunderstorms in the tropics.** *National Institute of Sciences of India, Proceedings,* 15(4):161–177, **1949.** figs., 21 refs. **DLC**—Dynamics of thunderstorms in tropics considered: causes of "frontal" and "heat" thunderstorms reviewed. Author states that frontal thunderstorms occur on the northern side of the high pressure belt in the upper air, while heat thunderstorms occur on the southern side in the Northern Hemisphere. Corresponding modification for Southern Hemisphere. Application of the vibrations of a clamped plate is made to the probability of occurrence of thunderstorms. Observations of cloud cells and methods of dealing by "parcel" and "slab" methods are also considered. *Subject Headings:* **Thunderstorm dynamics, Tropics.**—*From author's summary.*

H–218 551.515.4(43)

Mämecke, Karlheinz, **Die räumliche Verteilung der Gewitterhäufigkeit in Thüringen.** [The geographical distribution of frequency of thunder in Thuringia.] *Zeitschrift für Meteorologie,* 3(8–9):273–274, Aug.–Sept. **1949.** figs., table. **DWB**—Gives a chart of mean annual frequency, period mostly 1891–1925. Range 17.5 to 29 days; maximum on high ground. *Subject Headings:* **Thunderstorms, Germany.**—*C.E.P.B.*

H–219 551.551:551.515.4:551.509

Press, H. and Thompson, J. K., **An analysis of the relation between horizontal temperature variations and maximum effective gust velocities in thunderstorms.** *U. S. National Advisory Committee for Aeronautics, Technical Notes,* No. 1917, Washington, D. C., July **1949.** 12 p. fig., 4 tables, 3 refs. **DWB**—Results of this analysis indicate that the relation when extended to include frontal conditions appears useful for forecasting the intensity of turbulence for thunderstorms in temperate, though not in subtropical regions. *Subject Headings:* **Thunderstorms, Weather forecasting, Turbulence.**

H–220 551.515.4:551.509

Price, Saul, **Thunderstorm today—try a probability forecast.** *Weatherwise,* 2(3):61–63, June **1949.** 4 figs. **DWB**—Investigation of whether a general connection could be found between selected meteorological factors and subsequent thunderstorms, how strong that relationship was, and how it was affected by other factors operating at the same time. Smoothed curves of thunderstorm frequencies vs. weather relationships formed, which might be used to determine also future thunderstorm probabilities. Data from Wash. D. C., for July, 1939 to 1948, used as example. *Subject Heading:* **Thunderstorm forecasting.**

H–221 551.515.4(52)

*Sakuraba, S., **On the mechanism of heat thunderstorm and some properties of cumulonimbus in Japan.** *Geophysical Magazine, Tokyo,* 20:81–86, **1949.** Unchecked. *Subject Headings:* **Thunderstorms, Japan.**

H–222 551.577.53:551.576.11:551.515.4(78)

Schaefer, Vincent J., **The possibilities of modifying lightning storms in the Northern Rockies.** *U. S. Forest Service, Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Montana. Station Paper* No. 19, Jan. **1949.** 18 p. 5 refs. **DWB**—Report describes study of cumulus clouds near Priest Lake, Idaho. Recommendations given for an observation and cloud seeding program in this region. *Subject Headings:* **Thunderstorms, Cloud seeding, Idaho.**

H–223 551.515.4(437)

Schindler, Gerhard, **Die Gewitter in Nordwest-Böhmen.** [The thunderstorms in north-west Bohemia.] *Meteorologische Rundschau,* 2(5–6):171–172, May–June **1949.** 5 refs. **DWB**—Brief study of frequency and distribution of thunderstorms in region over a period of 29 years. *Subject Headings:* **Thunderstorms, Bohemia, Czechoslovakia.**

H–224 551.515.4

Schneider-Carius, Karl, **Sommergewitter in heissen, trockenen Sommern.** [Summer thunderstorms in hot, dry summers.] *Meteorologische Rundschau,* 2(5–6):143–146, May–June **1949.** fig., 2 tables, 12 refs. **DWB**—Author uses "Peplopause" for an inversion at heights of 1–3 km., usually marked by a great decrease of relative humidity upwards. The position of this on July 1–4, 1914, is shown. It was well-marked on July 2nd (no cloud); on the 3rd it weakened, and thunder developed. Classification of thunderstorms is discussed, and variations of "Peplopause" in dry summer of 1947 are related to days of thunder. *Subject Heading:* **Thunderstorms.**

H–225 551.594.21 551.594.22

†Schonland, B. F. J., **Thunder-clouds, shower-clouds and their electrical effects.** (In John A. Fleming's **Terrestrial magnetism and electricity,** [*Physics of the Earth—VIII,*] New York, Dover Publications, **1949,** chap. 12, p. 657–678. 4 figs., 2 tables, 64 refs., p. 657–678, 2 equations.) **DLC**—The thunder-cloud is studied in atmospheric electricity as the limiting case of a disturbed electric field in the air, the limit having been reached by the occurrence of electrical breakdown and the passage of a spark-discharge. Since many of its effects are found to be associated with shower-clouds in which the critical field is not reached, they are conveniently studied together. *Subject Headings:* **Atmospheric electricity, Thunderstorm electricity, Lightning.**—*Author's abstract.*

H–226 551.515.4:551.50

Similä, A., **Die aerologischen Gewittertendenzkarten.** [Aerological charts of thunderstorm tendencies.] *Tellus,* 1(4):18–23, Nov. **1949.** 4 figs., 6 refs., 8 equations. English abstract. **DWB**—A procedure is outlined for estimating numerically the factors which favor or oppose the development of thunderstorms. The resulting "thunderstorm tendencies" may be represented on synoptic charts; examples are given of the use of these charts in forecasting. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm forecasting.**

H–227 551.515.4:551.551:551.501.81

Thompson, J. K. and Lipscomb, V. W., **An evaluation of the use of ground radar for avoiding severe turbulence associated with thunderstorms.** *U. S. National Advisory Committee for Aeronautics, Technical Notes,* No. 1960, **1949.** 10 p. 2 figs., 3 tables, 3 refs. **DWB**—Effectiveness of ground radar indicated for determining and avoiding regions of severe thunderstorm turbulence in subtropical and temperate regions. Ground radar more effective with increasing altitude up to 25,000 ft. *Subject Headings:* **Thunderstorms, Turbulence, Radar storm detection.**

H–228 551.515.4(41)

Thunderstorm Census Organization, Great Britain, **British thunderstorms 1949, May 14–16.** Research Publication 49/15. Huddersfield, **1949.** Unchecked. Review in *Meteorological Magazine, London,* 79:28–29, Jan. **1950. DWB**—Series of charts are prepared showing the main overhead storm areas and principal damage areas. Additionally, strokes to earth outside damage areas are separately depicted and isochrones of the storm centers are shown hourly. *Subject Headings:* **Thunderstorms, Great Britain.**

H–229 551.515.4:551.551:629.13

U. S. Air Weather Service, **Further studies of thunderstorm conditions affecting flight operations: turbulence.** *Technical Report,* No. 105–39, **1949.** 31 p. 9 figs., 8 tables, 15 refs. **DWB**—Gust and draft data obtained from Thunderstorm Project flights around Orlando, Fla., and Wilmington, Ohio, are analyzed and conclusions indicated. *Subject Headings:* **Thunderstorms, Turbulence, Aviation.**

H–230 551.594.21

Wait, George R. and Gish, Oliver H., **Airplane measurements of charge carried to ground by thunderstorms.** Paper read at Geophysics Conference at Bernard Price Institute, Johannesburg, Union of South Africa, July 27, **1949.** Available through authors, Carnegie Institution of Terrestrial Magnetism, Washington, D. C. *Subject Heading:* **Thunderstorm electricity.**

H–231 551.515.4:551.594.21:551.501.81

Workman, E. J. and Reynolds, S. E., **Electrical activity as related to thunderstorm cell growth.** *American Meteorological Society, Bulletin,* 30:142–144, **1949.** fig., 7 refs. **DWB**—Electrical activity as observed by radar is correlated with visual observations of cloud development. Twelve storm cells studied. Tentative conclusions are drawn. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm electricity, Radar storm detection.**

1950

H–232 551.511:551.576.1

Austin, James M., **Cumulus convection and entrainment.** *American Meteorological Society, Compendium of Meteorology.* To be published, [**1950**]. 8 figs., 16 refs., 10 equations.—Cumulus clouds are discussed as projects of convection in the atmosphere following establishment of an unstable state of equilibrium. Parcel and slice methods of analyzing the convection problem are reviewed. The concept of entrainment and mixing is treated as an advance in analysis of cumulus convection. It recognizes that a cumulus cloud does not grow upward as an isolated column of

aturated air which cools at the moist-adiabatic rate. Data on convective showers given. Forecasting of cumulus development associated with causes of unstable state of atmosphere. Need for further theoretical analysis stressed. *Subject Headings:* **Cumulus clouds, Convection, Entrainment.**

H–233 551.515.41

†Bleeker, W. and Andre, M. J., **Convective phenomena in the atmosphere.** *Journal of Meteorology*, 7(3):195–209, June **1950.** 18 figs., table, 34 refs., 6 equations. **DWB**—Detailed data from 12 surface stations collected by the Thunderstorm Project in a 10 mile square at Wilmington, Ohio, have been used to set up simple models and to attempt to explain such convective phenomena as dry convection, cumulus circulation and thunderstorm dynamics. Elaborate charts of perturbation, pressure and wind fields for each half hour during the development and progress of a thunderstorm (Aug. 25, 1947) are drawn to show the changes in surface circulation patterns under a cumulus and cumulonimbus. The *pressure jump* and thunderstorm high are explained as due to strong cooling by precipitation. A scatter diagram shows that the relation between amount of pressure rise and rainfall during a thundersquall is almost linear. "Organized" convection is also discussed. *Subject Headings:* **Thunderstorm dynamics, Convection.**—*M.R.*

H–234 551.515.4

†Byers, Horace R., **Thunderstorms.** *American Meteorological Society, Compendium of Meteorology.* To be published, [1950]. 34 p. 7 figs., 44 refs. (Manuscript.)—This work is a broad, comprehensive review of all aspects of the thunderstorm problem as studied in the past three years, including such headings as: thunderstorm formation, dynamics, electricity, forecasting, squall line theories, radar observations, etc. Most of the factual material in this paper is contained in the author's publication, *The Thunderstorm*, (H–208) but some speculations, leading questions, theory and new results are added. *Subject Heading:* **Thunderstorms.**

H–235 551.576.11

Choudhuri, S. N. Ray, **A note on a simplified technique for obtaining lapse rate in cumulus cell when environment air is entrained.** *Science and Culture*, 15(8):327, Feb. **1950.** ref. **MH-BH**—Brief notation on improved technique with some details. *Subject Headings:* **Thunderstorm dynamics, Cumulus clouds.**

H–236 551.515.4(41):621.311

Forrest, J. S., **Variations in thunderstorm severity in Great Britain.** *Royal Meteorological Society, Quarterly Journal*, 76(329):277–286, July **1950.** 5 figs., 3 tables. **MH-BH**—Monthly records of breakdowns due to lightning on the British Grid system, 1934–1947, are compared with days of thunder at eight stations. The annual totals have a correlation of 0.74, but the frequency of breakdowns is more than twice as variable as thunder days. *Subject Headings:* **Thunderstorms, Great Britain.**—*C.E.P.B.*

H–237 551.594.21:551.575

Gross, Johannes, **Synoptisch-aerologische und luftelektrische Analyse einer eigenartigen Gewittererscheinung.** [Synoptic aerological and atmospheric electrical analysis of an unusual thunderstorm phenomena.] *Geofisica Pura e Applicata*, 16(1–2):19–37, Jan.–March **1950.** 15 figs., 14 refs. Summaries in German and English. **MH-BH**—The strange phenomenon of a thunderstorm (belonging to a cold front system) with fog and only one thunderclap is analyzed with regard to synoptic aerology and atmospheric electricity. *Subject Headings:* **Thunderstorms, Thunderstorm electricity, Fog.**

H–238 551.515.4 551.594.21

Kuettner, J., **The electrical and meteorological conditions inside thunderstorms.** *Journal of Meteorology*, 7, **1950.** (Unpublished). **MH-BH**—Greatest lightning activity is found to be in region of downdraft and heaviest rain. *Subject Headings:* **Thunderstorm electricity, Thunderstorm dynamics, Lightning.**

H–239 551.515.4:551.543

Mull, S. and Rao, V. P., **Dynamics of thunderstorms. Part I. Review of the present explanations for pressure change in thunderstorms.** *Indian Journal of Meteorology and Geophysics*, 1(2):116–136, April **1950.** 10 figs., table, 10 refs., 13 equations. **MH-BH**—Discussion of pressure changes in "instability thunderstorms." It is shown that pressure rise accompanied by a fall in dry bulb temperature is not the only type of pressure change which occurs with passage of a thunderstorm. There are also cases of thunderstorms accompanied by no pressure change or even by a pressure fall, or often by a rise and no appreciable change in dry bulb. *Subject Headings:* **Thunderstorm dynamics, Pressure variations.**

H–240 551.515.

†§Newton, C. W., **Structure and mechanism of the prefrontal squall line.** *Journal of Meteorology*, 7:210–222, June 1950. 20 figs., 27 refs., equation. **DWB**—Analysis of surface and upper air data obtained by the Thunderstorm Project during passage of squall lines, May and Sept. 1947, shows that such thunderstorm lines move more rapidly than the surface cold front, but a surface cold front always exists at the leading edge of the thunderstorm area. Structure and dynamics of this process (convection, cooling by precipitation and transfer of momentum upward or downward as the case may be) are discussed and illustrated by diagrams and cross sections. Case histories are treated for the whole eastern part of the U. S. A., with comments on formation of squall lines on stationary fronts or in non-frontal areas; preference for afternoon or evening hours, etc. *Subject Headings:* **Thunderstorm dynamics, Line squalls, Synoptic-aerological studies.**—*M.R.*

H–241 551.515.4(43)

Reinhard, H., **Die Gewitter in Mecklenburg.** [Thunderstorms in Mecklenburg.] *Zeitschrift für Meteorologie*, 4(3):66–72, March 1950. 2 figs. **MH-BH**—Chart of annual frequency of thunderstorms, 1889–1925, given. Frequency varies greatly from year to year. Severity greatest in west. Tracks of storms are described. Thunder is most frequent in May and Aug., but annual variation differed in different regions; the causes of this are set out. Mean daily frequency is shown in Greifswald. Frequency of associated hail is briefly described. *Subject Headings:* **Thunderstorm, Hail, Mecklenburg, Germany.**—*C.E.P.B.*

H–242 551.515.82:551.515.4:551.515.3

Tepper, Morris, **A proposed mechanism of squall lines: the pressure jump line.** *Journal of Meteorology*, 7:21–29, Feb. 1950. 15 figs., table, 16 refs. **DWB**—Proposed that the pre-coldfrontal squall line may be explained as a pressure jump induced by accelerations along a cold front and moving along an inversion in the warm sector as a gravitational wave. It is also suggested that the violent shower activity which is associated with such squall lines is set off by the passage of the pressure jump under suitable thermodynamic conditions. Speculatively it is proposed, by analogy to the theory of supersonic flow and shock waves, that the zone of interaction of two pressure jump lines is a preferred zone for tornado formation. *Subject Headings:* **Pressure jump, Line squalls, Thunderstorms, Tornadoes.**—*From author's abstract.*

H–243 551.594.21

Wait, George R., **Electric charge carried to ground through thunderstorms.** Also: Gish, Oliver H., **Problems of atmospheric electricity.** Papers read at University of Chicago Conference on thunderstorm electricity, Chicago, April 1950. To be published. Manuscript at Carnegie Institution of Terrestrial Magnetism, Washington, D. C.—Reports of first measurements of electrical current flow through the top of a thunderstorm. Appear to settle age-old question of maintenance of earth's charge. *Subject Headings:* **Thunderstorm electricity, Atmospheric electricity.**

H–244 551.515.4(436)

Weixlederer, R. **Über den Zusammenhang zwischen Labilitätsenergie und Gewitterbildung in den Nordalpen.** [On the relation between energy of instability and thunderstorm formation in the northern Alps.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 2(1):119–126, 1950. fig., 3 tables, 7 refs. Abstracts in German, English and French. **DWB**—A study on relations between instability energy and thunderstorm activity in Tyrol and Vorarlberg by radiosonde measurements, showed on the average, marked increase in thunderstorm frequency with rising instability. Diurnal variations also related to energy of instability. *Subject Headings:* **Thunderstorm dynamics, Instability, Alps.**

H–245 551.594.21:551.509.6

*Workman, E. J. and Reynolds, S. E., **Electrical phenomena occurring during the freezing of dilute aqueous solutions and their possible relationship to thunderstorm electricity.** *Physical Review*, 78(3):254–259, May 1950. 2 figs., table, 5 refs. **DLC**—Laboratory experiments on the freezing of 43 different chemical solutions gave a wide variation in electrical effects, as shown in table. Freezing of NH_4OH produced a potential difference of -232 volts. Methods and apparatus are described and illustrated. A discussion of electrical and molecular changes which explain differences, and of freezing processes during formation of rain and hail in thunderstorms is followed by speculation as to effects of modifying thunderstorm charges by use of large amounts of ammonia and to possible detection of chemicals in clouds. *Subject Headings:* **Cloud modification, Thunderstorm electricity.**—*M.R.*

BIBLIOGRAPHIES

H–246 551.515.4:016

†U. S. War Dept., Signal Office, **Thunderstorms and squalls.** (In its **Bibliography of meteorology**; a classed catalogue of the printed literature of meteorology from the origin of printing to the close of 1881; with a supplement to the close of 1889, and an author index. Oliver L. Fassig, ed. **Part IV—Storms.** Washington, D. C., Signal Office, **1891.** p. 237–301.) **DLC**—Numerous references to early works on thunderstorms and squalls arranged geographically. *Subject Headings:* **Thunderstorms, Squalls, Bibliographies.**

H–247 551.515.4:016

†U. S. Works Progress Administration, [**Thunderstorm section of card catalog of meteorology, 1937.**] Classified under U.D.C. No. 551.515.4. **DWB, MH-BH**—*Subject Headings:* **Thunderstorms, Bibliographies.**

H–248 551.515.4:016

†Knoch, K. and Blüthgen, J., **Elektrizität in Wolken und Niederschlägen.** (a). [Electricity in clouds and precipitation. (a).] 13 refs. **Gewitter.** (b). [Thunderstorms. (b).] 42 refs. **Blitze und andere elektrische Entladungen.** (c). [Lightning and other electrical discharges. (c).] 45 refs. (In the Geographisches Jahrbuch [Geographical Yearbook], 59, First section. Gotha, Justus Perthes, **1948.** p. 82–92.) **MH-BH**—Carefully selected bibliographic material with brief annotations in German following each section. *Subject Headings:* **Thunderstorms, Thunderstorm electricity, Lightning, Bibliographies.**

H–249 551.515.4:016

†Great Britain. Meteorological Office Library, [**Subject catalogue, section on thunderstorms, up to 1949.**] (Microfilm available.) *Subject Headings:* **Thunderstorms, Bibliographies.**

SUPPLEMENTARY MATERIAL

(*Received too late to place in proper order*)

H–250 551.515.4 551.594.21

†Sheppard, P. A., **The cumulonimbus and thunderstorm. Part I.** *Science Progress*, 38(149):78–88, Jan. **1950.** 3 figs., 29 refs., equation. **DLC**—U. S., British and German experimental investigations of the structure, circulation and thermodynamics of thunderstorms are reviewed and described, giving consideration to important recent observational material and theoretical developments. **Part II, Electrical phenomena.** *Ibid.*, 38(151):488–496, July **1950.** fig., 19 refs. **DLC**—Various theories of the origin of thunderstorm electricity are discussed and experimental investigations in this field are briefly reviewed. References are to recent and significant works. *Subject Headings:* **Thunderstorm dynamics, Thunderstorm electricity.**

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodicals included in this section, are for information only, and will not be listed in either the author or subject indexes. When material is furnished in advance of date of publication, the pagination may be omitted.

American Meteorological Society, Bulletin, Volume 31, Number 6, June 1950.

Droessler, Earl G.: **"Skyhook" plastic balloons for high-altitude soundings,** p. 191–193.
Bernard, Merrill: **The role of climatology in engineering,** p. 194–196.
Vederman, Joseph and Smith, Clarence D. Jr.: **The winter mid-troposphere circulation near the North Pole,** p. 197–205.
Mook, Conrad P.: **Some remarks concerning Taylor's prediction diagram,** p. 206–209.
Brooks, Charles F.: **Thirty years of the American Meteorological Society,** p. 210–214.
Machta, Lester: **Entrainment and the maximum height of an atomic cloud,** p. 215–216.
Sutton, O. G.: **Note on "Entrainment and the maximum height of an atomic cloud" by Lester Machta,** p. 217–218.
Schell, Irving I.: **Heavy snowstorms at Blue Hill (Boston), Mass.,** p. 219–221.

Geophysical Magazine, Tokyo, Volume 21, Number 2, March 1950.

Miyake, Y. and Saruhashi, K.: **A photochemical theory on the formation of the ozone layer in the atmosphere,** p. 99–107.
Nishimura, D.: **On the structure of typhoon (Part I),** p. 107–122.
Miyake, Y. and Saruhashi, K.: **The estimation of the height of fog by observing the ultra-violet solar radiation,** p. 122–125.
Fukuda, K.: **On the periodical appearance of abnormally low air temperature in Tohoku district and some particular paths of typhoon, and the sea water temperature,** p. 125–127.
Isono, K. and Huziwara, Y.: **An improved radiosonde,** p. 127–134.
Shiotani, M. and Yamamoto, G.: **Atmospheric turbulence over the large city-turbulence in the free atmosphere** (2nd report), p. 134–147.
Uwai, K.: **Analysis of the typhoon "Kathleen" (1) Mechanism of heavy rainfall and front in Kwanto, Chubu and Tohoku districts,** p. 147–166.
Tojo, S.: **On the thermal structure of troposphere over Japan,** in 1947, p. 166–176.
Sekiguchi, I.: **Climatological water balance problem in Japan,** p. 177–189.
Sawada, R.: **Temperature difference between mountain top and free air,** p. 190–198.

Hemel en Dampkring, Volume 48, Number 6, June 1950.

Van der Ham, C. J. and Kuiper, W. J. A.: **Berichten uit de weerkamer. Karakteristieke weertypen I.** [Reports from the Weather Bureau. Characteristic weather types.] p. 109–111.
Levert, C.: **Weeroverzicht,** Maart, April 1950, [Weather survey, March, April 1950], p. 107–108.

Hemel en Dampkring, Volume 48, Number 7–8, July–August 1950.

Van der Ham, C. J. and Kuiper, W. J. A.: **Berichten uit de weerkamer. Karakteristieke weertypen II,** [Reports from the Weather Bureau. Characteristic weather types], p. 125–127.

Journal of Meteorology, Volume 7, Number 3, June 1950.

Spar, Jerome: **On the theory of annual pressure variations,** p. 167–179.
Riehl, H., Yeh, T. C. and La Seur, N. E.: **A study of variations of the general circulation,** p. 181–194.
Bleeker, W. and Andre, M. J.: **Convective phenomena in the atmosphere,** p. 195–209.
Newton, C. W.: **Structure and mechanism of the prefrontal squall line,** p. 210–222.
Vierhout, R. R.: **On the formation of rain in clouds not reaching up to the freezing level,** p. 223–226.
Fleagle, Robert G.: **A theory of air drainage,** p. 227–232.

Crary, A. P.: **Stratosphere winds and temperatures from acoustical propagation studies,** p. 233–242.

Penndorf, R.: **Absorption of solar energy by oxygen molecules in the E-layer,** p. 243–244.

Journal Scientifique de la Météorologie, Volume 2, Number 6, April–June 1950.

Rouaud, A.: **Quelques considérations sur les trajectoires et les lignes de courant,** [Some considerations on trajectories and flow lines], p. 33–49.

Ricard, Mlle Y.: **Recherche polarographique d'alcalins dans l'eau de pluie,** [Polarographic research on alkaline content of water], p. 50–55.

Doury, P.: **Essai d'étude statistique des sources d'atmosphériques en Europe et sur l'Atlantique Nord,** [Statistical study of sources of atmospherics in Europe and over the North Atlantic], p. 56–64.

Meteorological Magazine, London, Volume 79, Number 938, August 1950.

Saunders, W. E.: **Method of forecasting the temperature of fog formation,** p. 213–219.

Brock, D. S.: **Cambridge University Iceland expedition of 1947,** p. 219–222.

Swithinbank, C.: **Oxford University Iceland expedition of 1947,** p. 222–224.

Snowstorm during the night of April 25–26, 1950, p. 224–231.

Smith, L. P.: **Variations of mean air temperature and hours of sunshine on the weather slope of a hill,** p. 231–232.

Letters to the Editor

Frequency of wind and radiation frosts, p. 235.

Temperature rise on clear mornings, p. 236–237.

Notes and News

Tropical rainfall from cloud which did not extend to the freezing level, p. 237–238.

Monthly Weather Review, Volume 78, Number 3, March 1950.

Gentry, Robert C.: **Forecasting local showers in Florida during the summer,** p. 41–49.

Winston, Jay S.: **The weather and circulation of March 1950,** p. 50–51.

Teweles, Sidney, Jr. and Norton, Lewis C.: **The intense midwest storm of March 25–27, 1950,** p. 52–57.

Monthly Weather Review, Volume 78, Number 4, April 1950.

Beebe, Robert G.: **Forecasting winter precipitation for Atlanta, Ga.,** p. 59–68.

Winston, Jay S.: **The weather and circulation of April 1950,** p. 69–70.

Pierce, Charles H. and Norton, Lewis C.: **Meteorological conditions affecting floods and heavy snow in North Dakota and Minesota, April 24–26, 1950,** p. 71–74.

Rivista di Meteorologia Aeronautica, Volume 9, Number 4, Oct.–Dec. 1949.

Serra, Antonio: **Contributo alla climatologia delle Baleari,** [Contribution to the climatology of the Balearics], p. 3–18.

Frank, Marco: **Sistema di sincronismo per facsimile,** [Method of facsimile synchronization], p. 19–24.

Fea, G. and Panetta, D.: **Dispositivo per l'esatto rilevamento del punto al suolo nei sondaggi,** [A device for precise determination of base-line points for radiosondes], p. 25–28.

Royal Meteorological Society, Quarterly Journal, Volume 76, Number 329, July 1950.

James, R. W.: **On the theory of large-scale vortex motion in the atmosphere,** p. 255–276.

Forrest, J. S.: **Variations in thunderstorm severity in Great Britain,** p. 277–286.

Pasquill, F.: **Some further considerations of the measurement and indirect evaluation of natural evaporation,** p. 287–301.

Best, A. C.: **Empirical formulae for the terminal velocity of water drops falling through the atmosphere,** p. 302–311.

Jones, R. F.: **The temperatures at the tops of radar echoes associated with various cloud systems,** p. 312–336.

Crossley, A. F.: **Relation between the standard deviations of temperature at constant pressure and a constant height,** p. 337–340.

Riehl, Herbert and Yeh, T. C.: **Some comments on the trade-wind cell,** p. 340–342.

Jordan, Charles L.: **North-south profiles of the average zonal wind component at the surface,** p. 343–344.

Gordon, A. H.: **The ratio between observed velocities of the wind at 50 feet and 2000 feet over the North Atlantic Ocean,** p. 344–348.

Weather, Volume 5, Number 7, July 1950.

Wood, C. A.: **Synoptic holiday,** p. 235–240.
Boughner, C. C.: **The Red River flood—spring 1950,** p. 241–245.
Levick, R. B. M.: **Fifty years of British weather,** p. 245–247.
Schumann, T. E. W.: **The fundamentals of weather forecasting, (Pt. II),** p. 248–253.
Bonacina, L. C. W.: **The Buckinghamshire tornado,** p. 254–255.
Simmonds, J.: **The English tornadoes of 21 May 1950,** p. 255–257.
Ludlam, F. H. and Wexler, R.: **The growth of ice particles in cumulonimbus,** p. 262.
Scorer, R. S.: **Gravity waves,** p. 262–263.
Matthews, L. S.: **Low dew point at Khartoum,** p. 263.

Weather, Volume 5, Number 8, August 1950.

Burgess, C. R.: **Weather and milk,** p. 267–269.
Reichelderfer, F. W.: **The United States Weather Bureau,** p. 273–277.
Carruthers, J. N. and Lawford, A. L.: **Water movements and winds,** p. 278–283.
Murray, R.: **Freezing level over the British Isles,** p. 284–287.
Feteris, P. J.: **The Dutch tornado of 21 June 1950,** p. 287–289.

Weatherwise, Volume 3, Number 3, June 1950.

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